THE MEMBERS MAGAZINE OF THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

Terra

Vol. 17/No. 3 Winter 1979

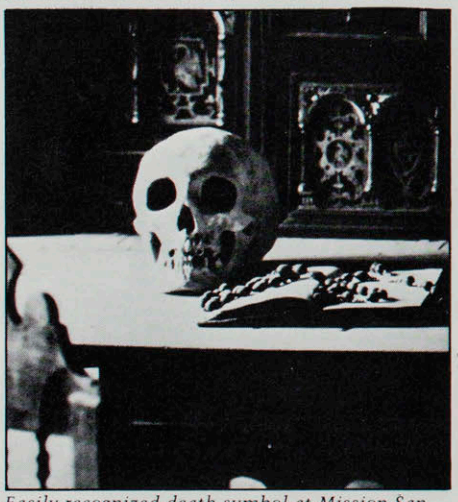
CURATORS AND COLLECTIONS

REDISCOVERED "LOST" SPANISH-AMERICAN HERITAGE

A fifteen-year search and study of Spanish colonial churches in Mexico and the California missions has resulted in the discovery of a large and important body of "lost" art. History Division Research Associate James L. Nolan has rediscovered and photographed devotional art of remarkable beauty. "The Lost Artistic Heritage of the Spanish-American Founders of California," now on display on the main floor, contains thirty-one dazzling color photographs enlarged from 35 mm slides by Peacock Color Laboratory of Hollywood.

Some of the art was lost through removal from its original and proper location; the historic identity of other art pieces was lost through time; and perhaps most importantly, the underlying beauty and symbolism of other works was lost to the beholders.

The art of the missions of California operating in the late 18th and early 19th centuries was based on the same ideas that influenced more sophisticated art forms developed in Mexico. In Taxco, Guanajuato, and other Mexican cities, as in the missions of San Diego, San Buenaventura, and others in California, church ornamentation reflected medieval artistic values and models. The rich meanings of the placement of particular works of art, the poses of figures, and the decorations surrounding them compose "The Lost Artistic Heritage" of California, explored and illustrated in Nolan's research and photographs. The Museum visitor can see this lost art in the gallery west of "The American: This New Man" (Bicentennial Hall) until December.



Easily recognized death symbol at Mission San Fernando Rey.

SEARCH FOR NEW FOSSIL REMAINS

Vertebrate Paleontology Section will be doing extensive field work in the Mojave Desert, Tehachapi Mountains, western San Gabriel Mountains and Southern Coast ranges, starting next month.

In 1959 the Museum purchased the California Institute of Technology fossil vertebrate collections. Under the leadership of Dr. Chester Stock, Cal Tech students did extensive vertebrate fossil collecting for over twenty years before 1950 in the southern half of California. This work is responsible for discovery of over 400 fossil localities, most of which have not been carefully examined since the 1930's. The new field work will attempt to re-examine localities in hopes of finding new remains. The particular emphasis will be to examine the localities in detail to see if any might still be yielding small, often microscopic sized vertebrate fossil bones (salamanders, lizards, snakes, shrews, moles, bats and rodents). These small fossils were generally missed by collectors prior to the 1960's when new techniques often made it possible to recover large samples.

PELICAN ART AND ARTIFACTS

The Ornithology Section's exhibition of art and artifacts entitled "The Eclectic Pelican" has been very popular and received much notice in the media: Jack Smith, Los Angeles Magazine, PSA Magazine, National Airlines Aloft, and many local newspapers. By the way, "eclectic" refers to the art and not to the pelican. The show continues through March on the second floor, and profits from the sale of the pelican poster, done for the exhibit, are going towards building a new bird hall exhibit.

MUSEUM HOST FOR GOLD SPECIAL

The Museum was the host for a press preview of the newest National Geographic special, "Gold." The press and film community attended the preview, held in the Board Room and the new Hall of Gems and Minerals. The Museum was chosen to host the event because of its outstanding "Gold Rush" exhibit, which houses the largest public native gold exhibit in the world.

Highlights included a tour of the Gold exhibit conducted by Dr. Peter Keller, and a cooking demonstration using a solid gold frying pan weighing about six pounds. Gold is an excellent conductor of heat and as such, produces "the perfect cooking utensil." The guests were treated to a chocolate mousse cake covered with 24 kt. gold leaf intended to be eaten along with the cake. The film itself proved to be an even greater treat. Produced by the National Geographic Society and narrated by E. G. Marshall, **(continued on page 30)**

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CONTENTS

Eyeing Dinosaurs **3**

Objects of Bright Pride **10**

Pacific Frontiers **18**

To Some, Only a Clam **24**

Sperm Whale Stranding In Baja California **28**

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THE COVER

The foot of Tyrannosaurus rex Osborn, *1905. Bipedalism, or walking erect on the hind legs as humans do, evolved in many dinosaur groups. The hind legs were rotated forward close to the body and the animal assumed a nearly erect posture. Bipedalism gave* Tyrannosaurus rex *the great advantage of speed in the pursuit of prey. This nearly complete left foot was extremely powerful and undoubtedly served very well for catching and holding prey. Notice the large claws at the ends of each toe and compare this foot with that of the plant eating duckbilled dinosaur,* Anatosaurus, *which was also bipedal. Formation and Age: Hell Creek Formation, latest Cretaceous Period, approximately 70 million years. Locality: Garfield County, Montana. Collected by Museum field party in 1966.*

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EYEING DINOSAURS

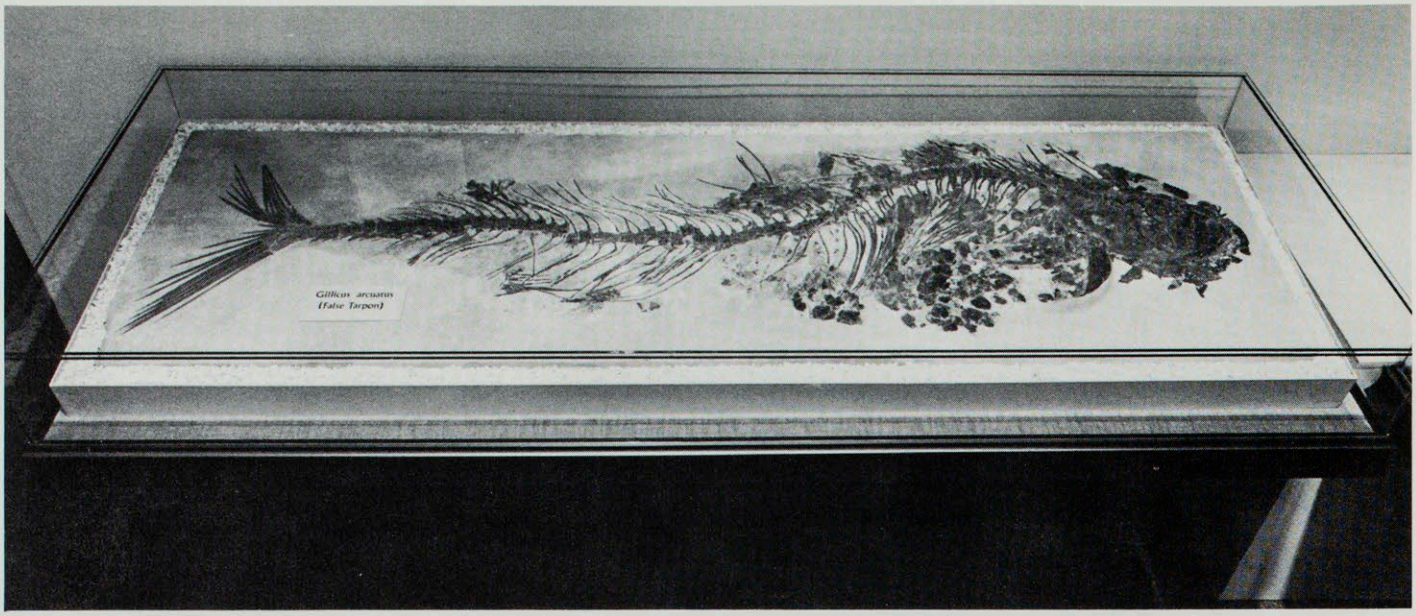
THOUGHTS ABOUT THE PREVIEW TO THE HALL OF MESOZOIC LIFE

by Kilbee Brittain

The "Preview to the Hall of Mesozoic Life" at the Natural History Museum of Los Angeles County is now open, offering a tantalizing preview of the larger hall to come, the William T. Sesnon Hall of Mesozoic Life, and a glimpse of an age so distant that it is difficult to realize what our world looked and felt like.

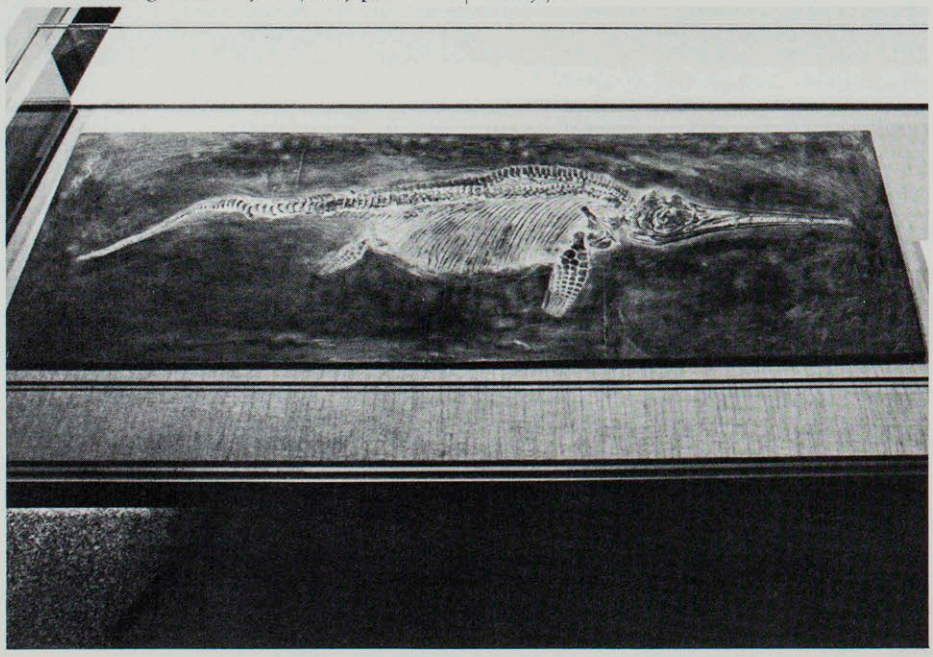
At the beginning of the Mesozoic, or Middle-Life, Era, the earth was warm and wet; continents clumped together in one super-continent scientists call Pangaea. What are now Europe and Africa were connected to North and South America, and a good part of North America was covered by great seaways. In the warm seas, Protozoa grew shells of lime, deposits of which formed cliffs like the White Cliffs of Dover. Corals, snails, clams abounded. In the swamplands, ferns and fern trees flourished. There would be no flowering trees for 100 million more years. There were no birds, no mammals, no modern fishes. But there were dinosaurs, some chicken-sized, some fifty tons, radiating into every ecological niche, eating plants, eating each other, hopping and racing and plodding over the flat tropical landscape, dominating the earth for a good 160 million years, from about 230 to 70 million years ago.

Such numbers of years sound impressively ancient, but most of the earth's geologic history had already passed by the time of the first dinosaurs. The earth is believed to be about four-and-one-half billion years old. Three billion years ago, bacteria had appeared. A billion-and-a-half years ago blue-green algae may have formed, but it was not until about 570 million years ago, at the beginning of the Paleozoic, or Old-Life, Era, that there was an explosion of invertebrate forms, trilobites among them, in the Cambrian seas. Archaic fishes began to appear about 500 million years ago, and fifty million years after that, the first land plants. By 400 million years ago, amphibians had begun to lead their double life on land but with dependence on a watery environment on an Earth which had grown its first trees. Fifty million years later, amphibians had radiated over the land masses, and the first primitive reptiles had evolved. Gradually, reptiles replaced amphibians as the dominant group, having evolved the amniote egg, which carried the embryo in its own sea of life, thus freeing reptiles from the watery environment amphibian eggs need for survival. The Paleozoic Era came to a close in its Permian Period with mass extinctions, perhaps because of climate changes and widespread glaciation.



False tarpon Gillicus arcuatus *(Cope, 1875). The late Cretaceous chalk deposits of the Niobrara Formation in Kansas are well known for yielding many well preserved vertebrate fossils. This nearly complete skeleton of* Gillicus arcuatus *represents a gigantic relative of the modern herring like fishes. During Cretaceous times the Western Interior of North America was covered by a shallow ocean which extended from the Arctic Slope of Canada to the Gulf of Mexico, a distance of approximately 3000 miles, and reaching 900 miles in width. The marine deposits of the Western Interior basin contain numerous kinds of shells, fishes, and both flying and swimming reptiles. Niobrara Formation, late Cretaceous Period, approximately 85 million years old. Logan County, Kansas.*

Marine reptile. Ichthyosaur. *Of all the reptiles, those that were most highly adapted to life in the water were the air breathing ichthyosaurs or "fish-reptiles." They appear to have occupied the place in nature now taken by the dolphins and porpoises. They were particularly abundant in Jurassic times (180-120 million years ago) but the group lived for the greater part of the Mesozoic Era. Many complete and well preserved specimens, such as one from which this cast was made, have been recovered on slabs of black shale of lower Jurassic age at Holzmaden in Wurttemberg, Germany. Perfectly preserved specimens show the body outline and the presence of a large fin in the middle of the back. The limbs were reduced to short steering paddles and the main swimming motion must have been fish-like side to side undulation of the body and the tail fin. The skull was highly modified for aquatic life. The eyes were large and the snout formed a long projection which was armed with the short dolphin-like teeth. Most ichthyosaurs were between four and eight feet long; exceptional ones, like those known from Ichthyosaur State Park, Nevada, reached thirty feet.*



The beginning of the Mesozoic era marked the beginning of many new forms of life, including the dinosaurs. The three Periods of the Mesozoic Era, beginning with the oldest, are the Triassic, the Jurassic, and the Cretaceous. The first dinosaurs evolved in the Triassic, about 230 million years ago, from a group of reptiles called thecodonts. They were about the size of chickens, and ran on long hind legs, the first creatures to walk erect. Recent theories suggest that this great step—standing bipedally instead of sprawling on four legs as most lizards do, thus increasing the stride and also the energy output—may have been caused by a change in dinosaur metabolism when, according to some scientists, they became warm-blooded, endothermic hunters able to sprint after and catch cold-blooded, sluggish reptilian prey.

This hypothesis of dinosaur endothermy is supported by other findings. Many dinosaurs fed in herds and hunted in packs (very unreptilian behavior), as trackways of fossilized footprints show. Analyses of dinosaur bone tissue show similarities to mammalian rather than reptilian bone, although this would not prove endothermy. The great dinosaurs, because of their huge body mass, would have retained heat despite their lack of insulation. Some scientists propose taking dinosaurs out of Class Reptilia; they would create a Class Dinosauria because of the huge chasm between the ectothermy of reptiles and the hypothesized endothermy of dinosaurs.

In the Triassic, the first part of the Mesozoic era, the early small dinosaurs evolved into two groups, based on pelvic structure. The Ornithischians could move on four or two legs, and ate only plants. The Saurischians also could move on four or two legs, but this group included carnivores as well as herbivores. Each

group contained many species.

Some dinosaurs were small, speedy predators, snatching the eggs of fellow dinosaurs as well as any prey they could grab. Some other species grew to monstrous proportions familiar to us from comic strips (where such ancient animals are quite inaccurately shown with "cave-man" companions), and from movies, where their jerky mechanized actions quite belie the well-coordinated movements they probably made.

In the fifty million-year-long Jurassic Period, the middle part of the Mesozoic, the largest land vertebrate the world has ever seen evolved: *Brachiosaurus*, forty feet high with head and neck extended, eighty feet long, fifty tons, supporting its great weight in a watery environment, thrusting its long neck deep into the waters to feed on plants. This age also saw the development of the herbivorous *Stegosaurus*, an American genus of a plate-backed type of dinosaur found throughout the world. The plates probably were heat conductors, the spikes on the tail formidable weapons. *Allosaurus* and *Camptosaurus*, the carnivorous dinosaur attacking a herbivore in the main lobby of the Museum, are Jurassic dinosaurs. The end of this period marked the evolution of the first birds.

The last part of the Mesozoic Era, the Cretaceous, began around 130 million years ago. This is the age of armored *Ankylosaurus*, trudging about like a tank; three-horned *Triceratops*, roaming over Montana in herds, and the most famous fierce carnivore, *Tyrannosaurus rex*, nineteen feet tall when standing erect and fifty feet long, preying on duckbill dinosaurs and the other what seem to us bizarre forms which flourished in the Cretaceous.

Pteranodon *Marsh, 1876. Pterodactyl—Flying Reptile. (On the wall, to the right) The best known American Pterodactyl, and second only in size to the giant* Quetzalcoatlus, *is* Pteranodon *from 85 million year old rocks called the Niobrara Formation in Kansas. This unusually large and well preserved skull demonstrates a remarkable feature of* Pteranodon, *with its long toothless jaws balanced by a long crest-like extension of the skull. The skull was nearly twice as long as its spinal column, and the wingspread of this individual may have been between twenty and twenty five feet. Despite its great size,* Pteranodon *probably weighed no more than thirty pounds. On the left is a Duckbilled Dinosaur skull from Red Deer Valley, Alberta, Canada.*

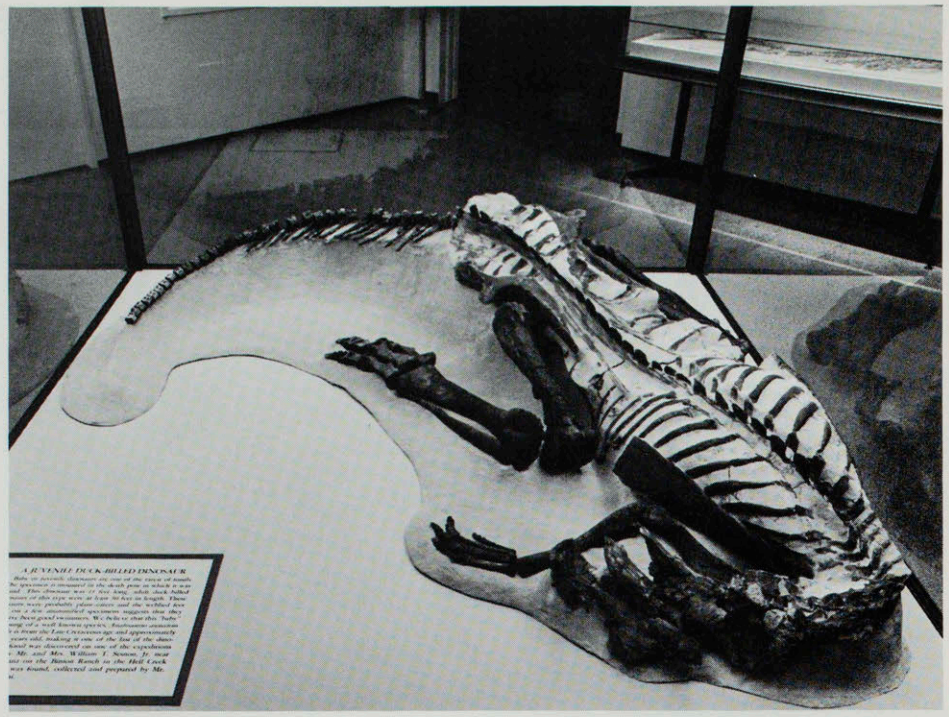
Enormous geologic and climatic change marked the Cretaceous Period. Mountains chains were building up, flowering plants evolved, snakes, birds, and early mammals were spreading, forests and swamps looked more as they do today, tropical areas were shrinking. The climate was cooling.

By the end of the Cretaceous Period, about sixty-five million years ago, the dinosaurs had died out. There were no large animals left, only those forms which had been the least conspicuous Mesozoic creatures, small primitive mammals, some birds, a few reptiles. The giants had disappeared, as had the fish-eating pterosaurs from the skies, the plesiosaurs from the seas, the small carnivorous dinosaurs, even much plankton from the sea.

In geological time, their extinction seems cataclysmically rapid: some scientists believe the death of so many forms took only a few thousand years, others believe a few million. It may have taken dinosaurs as long to die off as it took *Homo* to become modern man. The mystery is *why* dinosaurs expired, after 150 million years of ruling life on earth.

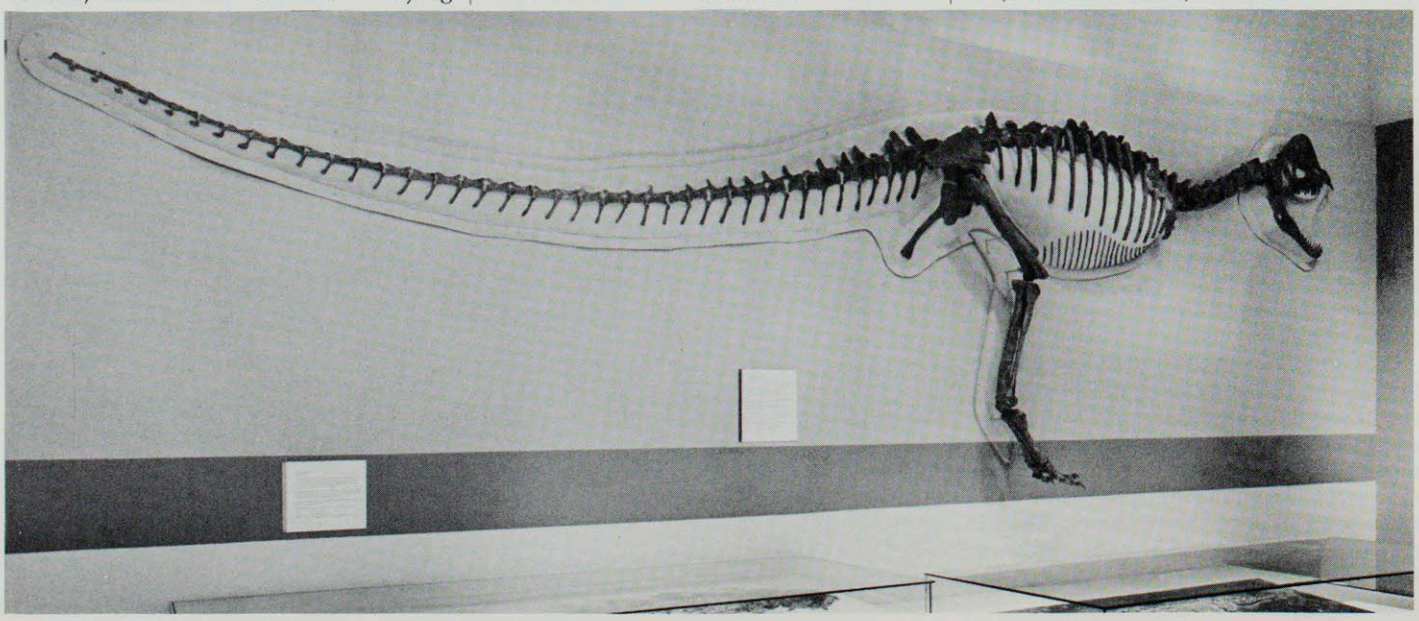
A number of theories are offered.

One theory centers around the rise of mammals, small, furtive, nocturnal, egg-stealing carnivores. Another postulates an enormous explosion of a supernova which would have had catastrophic and prompt results from radiation and climate change. Another related theory blames climatic changes. It is certain that by the end of the Cretaceous Period, the climate had become cooler. Vegetation changed, swamps were drying up, seas were withdrawing, continents were shifting, all these changes creating intolerable environments for the dinosaurs which had triumphed over all other forms in warmer, wetter times. The stress of trying



A juvenile Duckbilled Dinosaur. Baby dinosaurs are one of the rarest of fossils. The specimen is mounted in the death pose in which it was found. The dinosaur was thirteen feet long: adults are at least thirty feet long. They were probably plant-eaters and the webbed feet found on a few mummified specimens suggests that they must have been good swimmers. It's thought this "baby" is Anatosaurus annectens. *Found near Jordan, Montana, collected and prepared by Harley J. Garbani.*

Double-crested Dinosaur, Dilophosaurus wetherilli *(Wells, 1954) In the summer of 1942, a field party from the University of California Museum of Paleontology collected a dinosaur on the Navajo Indian Reservation in Arizona. This nearly complete skeleton was later described by Dr. S.P. Wells as a new species of medium-sized carnivorous dinosaur. The generic name* Dilophosaurus *(meaning* di-*double;* lophos-*crest;* sauros-*lizard) refers to the paired flange-like crests on the skull. The short front limbs and large hind legs suggest that* Dilophosaurus wetherilli *walked or ran on its hind limbs and could move quickly. All carnivorous dinosaurs such as* Dilophosaurus, *in the Suborder Theropoda, first appear in the late Triassic Period and became the dominant predators of the later Jurassic and Cretaceous Periods. This cast was made from the original skeleton which is now at the University of California Museum of Paleontology in Berkeley. This mount is based upon a nearly complete skeleton and parts of a second, from which the first has been restored. Kayenta Formation, early Jurassic Period, approximately 170 million years. Near Tuba City, Coconino County, Arizona.*



Duckbilled dinosaur, Anatosaurus annectens *(Marsh, 1890). Sometimes known as* Trachodon, Anatosaurus *is probably the most common duck-billed dinosaur from rocks of late Cretaceous Age in North America. The generic name is a compound of the Greek* anatos—*"harmless—*sauros— *"lizard", for its harmless vegetarian habit, the Latin species name* annectens—*"linking", "joining", for the interlocking teeth. This skull is part of a nearly complete skeleton found by a Museum expedition in the summer of 1965. A few tail vertebrae were weathering out of a slope when found. Exploratory digging revealed about five feet of tail. The specimen was covered until the following year when excavation was started in June of 1966. With the exception of the four or five feet of tail that had originally weathered away, the loss of a right arm, shoulder, and some ribs which were washed away or eaten before burial, the skeleton was complete with every bone in place. It was lying on its left side in extremely hard ancient river sands. The carcass had apparently formed the core or nucleus for a sandbar. Fish remains were mixed with the skeleton. The duckbilled dinosaurs were descendants of* Camptosaurus *of the late Jurassic Period. Many were aquatic, spending much of their time in the water, and indeed some may have spent practically all of their time in the water, coming ashore only to lay eggs or browse on land plants. Hell Creek Formation, Garfield County, Montana.*

to adapt to such changes apparently caused thinning of the dinosaur eggshells. Studies of fossil dinosaur eggs show the shells becoming progressively thinner as the Cretaceous Period grew older. This stress reaction has been shown in eggshell thinning in modern birds. Dinosaurs which could maintain their body heat in a continually warm climate could not have adapted to the new seasons, could not survive the long cold winters as could their distant relatives, the cold-blooded reptiles, whose low metabolism did not require great amounts of warmth and food, and which could burrow and lie in torpor through the long winter. Birds with their feathers and mammals with their fur, however, were able to survive the new chill.

Yet dinosaurs may have left their legacy on earth. The first bird, *Archaeopteryx,* had an almost dinosaurian skeleton; it also had feathers, which in death it left delicately imprinted as a fossil in rock. But it probably could not fly well, since it lacked the large breastbone and other skeletal parts for attachment of flight muscles. The feathers were probably for insulation, an adaptation to a cooling climate which permitted this small dinosaur-like creature to survive its huge relatives, and to evolve eventually into the myriad species inhabiting our skies and trees. Some scientists would like to see Class Aves become the third order, and only living order, of Class Dinosauria.

The close of the Mesozoic Era brings us to the brink of a more familiar world. The Mesozoic saw the rise and rule of creatures we will never see again except as we flesh them out from their fossilized bones, and use our imaginations to see them moving spryly or ponderously through the warm swamps and forests of a foreign land and time.

A juvenile Tyrannosaurus rex? *During the summer of 1966, Harley Garbani of the Natural History Museum discovered and collected this incomplete dinosaur snout and jaws from rocks of the Hell Creek formation near Jordan, Montana. The specimen was originally identified as a juvenile* Tyrannosaurus rex *because of its small size and occurrence in the Hell Creek Formation. However, a recently published description of this specimen by Dr. Ralph Molnar concluded that this animal probably represents an unnamed new genus and species of* Tyrannosaurus*-like carnivorous dinosaur.*

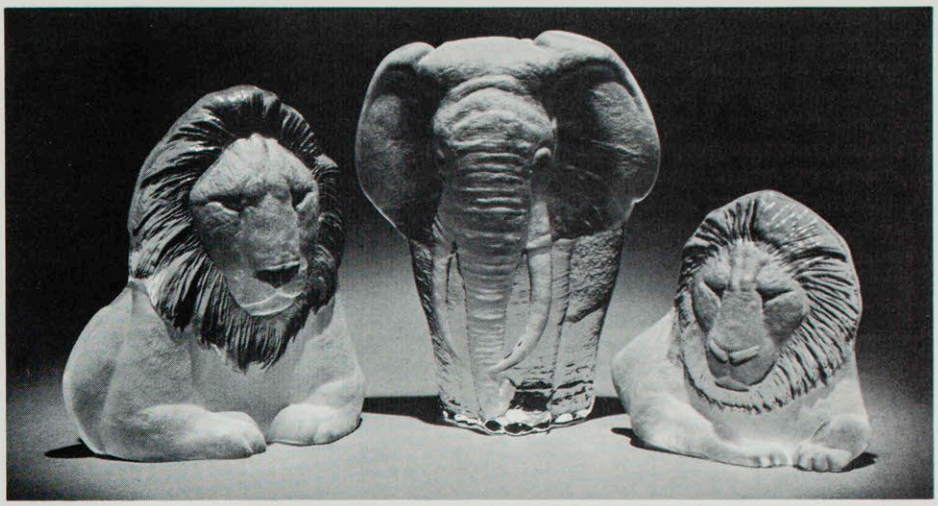
Photos by Larry Reynolds

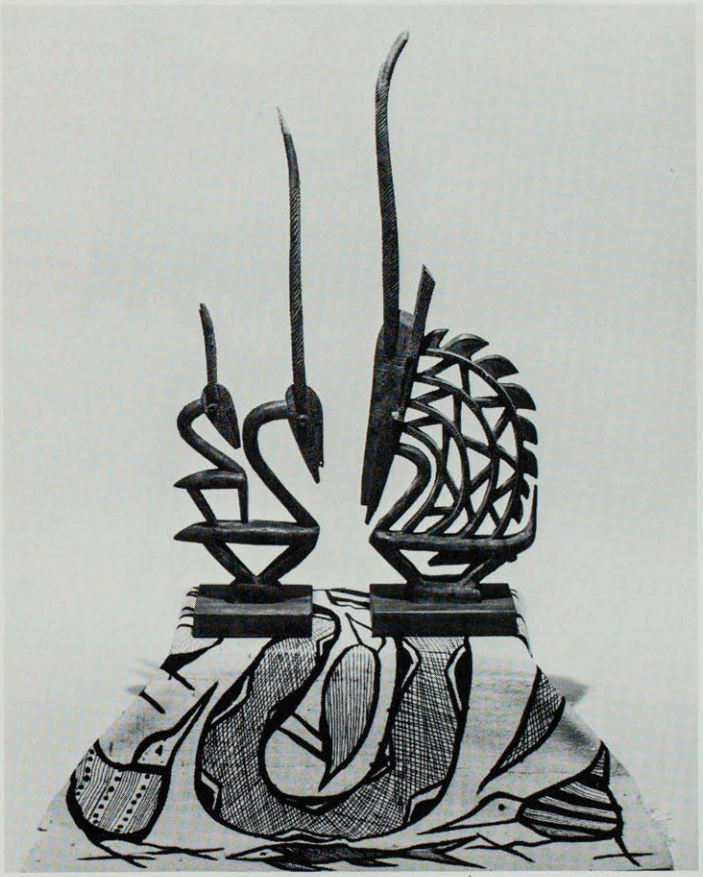
The foot of Duckbilled Dinosaur, Anatosaurus annectens *(Marsh, 1890). In contrast to the large terrestrial carnivorous* Tyrannosaurus rex*, the duckbilled* Anatosaurus *was probably a semi-aquatic plant eater spending much of its time feeding in swampy pools. Duckbilled dinosaur mummies have been discovered in North America. These appear to represent specimens that had dried and became mummified before burial. A web of skin was present between the fingers of the hand: the feet may also have been webbed. The hind limbs and stout tail were probably effective in swimming. This foot is part of a nearly complete skeleton that includes the large skull of* Anatosaurus annectens *on display in this hall. Hell Creek Formation, latest Cretaceous Period, approximately 70 million years. Garfield County, Montana.*

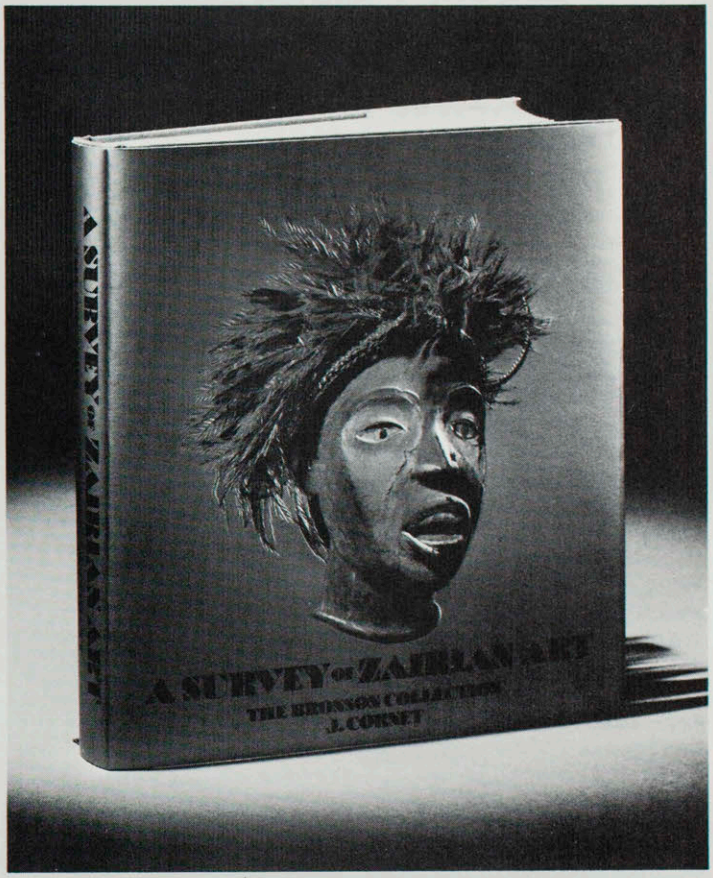
Kilbee Brittain, although not as old as her subject matter, has been visiting the Museum ever since she could walk, and is happy to have some "new" old bones to look at. She is Associate Editor of TERRA, and a free-lance writer.

MUSEUM SHOPS

The Bronson Collection of Zairian Art currently on display in the Alliance Gallery has been extended through September 2, 1979, by popular demand. This remarkable collection of art has increased interest in Zaire, and other African cultures as well. The Museum Shops are pleased to spotlight Africa's art and inspiration for art.







IN THE ETHNIC ARTS SHOP... We offer some of the most elegant and dramatic wood carvings in all of Africa—from the Bambara Tribe in Mali. These carvings are of Chi Wara, the god of agriculture, in the distinctive shape of a stylized antelope. A symbol of fertility, rituals centering around Chi Wara are observed at the opening of the planting season and during the harvest. Small (female): $80.00, Large (male): $100.00

IN THE BOOK SHOP... We present *A Survey of Zairian Art—The Bronson Collection*, a complete and colorful catalog of the exhibit currently on display at the Museum. Written by Fr. Joseph Cornet, Director General of the National Museums of Zaire, this beautiful art book presents through text, photographs of the collection, and regional maps, a thorough overview of the art of the Congo Basin. Printed in a limited edition, this volume will soon become a collector's item. 10½"x 11¾," 379 pages, hardbound, price $75.00

IN THE PAGE MUSEUM SHOP... We present from Sweden the finely crafted lead crystal art of designer Mats Jonasson, taking his inspiration from African wildlife. Each piece is signed and numbered. Elephant: $50.00, Large Lion: $45.00, Small Lion: $30.00

THE ETHNIC ARTS SHOP
Natural History Museum
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THE BOOK SHOP
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THE PAGE MUSEUM SHOP
George C. Page Museum
5801 Wilshire Blvd.
Los Angeles, Calif. 90036

OBJECTS OF BRIGHT PRIDE

NORTHWEST COAST INDIAN ART FROM THE AMERICAN MUSEUM OF NATURAL HISTORY

By Nancy Blomberg

Beginning April 22, 1979 the Museum of Natural History of Los Angeles County is privileged to present a major exhibition of Northwest Coast Indian art.

Organized by the Center for Inter-American Relations and The American Federation of Arts, New York, the exhibition will be presented at five American museums under the auspices of the AFA before returning to New York City for its final presentation at the Center for Inter-American Relations in the spring and summer of 1980. Allen Wardwell, guest curator for the exhibition, has selected 100 superb objects from the extensive collection of The American Museum of Natural History, New York. More than half of these objects have never before been published and most have not been displayed except for a brief period at the time they were acquired by the museum in the late nineteenth century. Mr. Wardwell, who is presently Director of the Asia House Gallery and formerly curator of Primitive Art at The Art Institute of Chicago, has also written the text for a fully-illustrated catalogue published attendant to the exhibition. Both the exhibition and publication are supported by a grant from the National Endowment for the Arts.

SHAMAN'S FACE MASK, *Tlingit. Wood, operculum, ivory, hair, animal skin, rawhide, red, white and green pigment, 20 cm high (exclusive of hair). Collected by G. T. Emmons between 1882–87 at Chilkat, this mask represents a dead man.*

LIFE IN A LUSH ENVIRONMENT Stretching northward for more than a thousand miles from Puget Sound to Yakutat Bay, Alaska is a particularly beautiful area referred to as the Northwest Coast. This narrow strip of land is characterized by high mountains which are intersected by numerous rivers cutting deep fiords as they empty into the sea. Just offshore lie a series of islands both large and small that create a myriad of intersecting waterways and beaches protected from devastating ocean storms. The extreme cold temperatures expected at such a high latitude are moderated by the warm Japanese current flowing southward along the coastline.

Rainfall is high along the coast, averaging well over 100 inches per year in some areas. This rain combined with the relatively warm temperatures produces a lush forest environment of cedar, spruce, fir, alder, and hemlock. Smaller plants such as berry bushes also flourish in abundance.

Land animals run the gamut, from large game such as deer, bear, and mountain goat and sheep, to smaller animals such as otter, beaver, marten, and mink.

The ocean abounds with shellfish, salmon, halibut, herring, and oulachon, as well as sea lions, porpoises and whales.

Inhabiting this rich environment for centuries are several tribes referred to collectively as Northwest Coast Indians. While six northern tribes (Tlingit, Haida, Tsimshian, Bella Coola, Bella Bella, Kwakiutl) can be distinguished, each with its own specific cultural traits, the many shared traits allow this grouping into a larger cultural unit.

The prehistory of the Northwest Coast is poorly known. Heavy rains and dense vegetation have over the centuries combined to destroy much of the archaeological evidence.

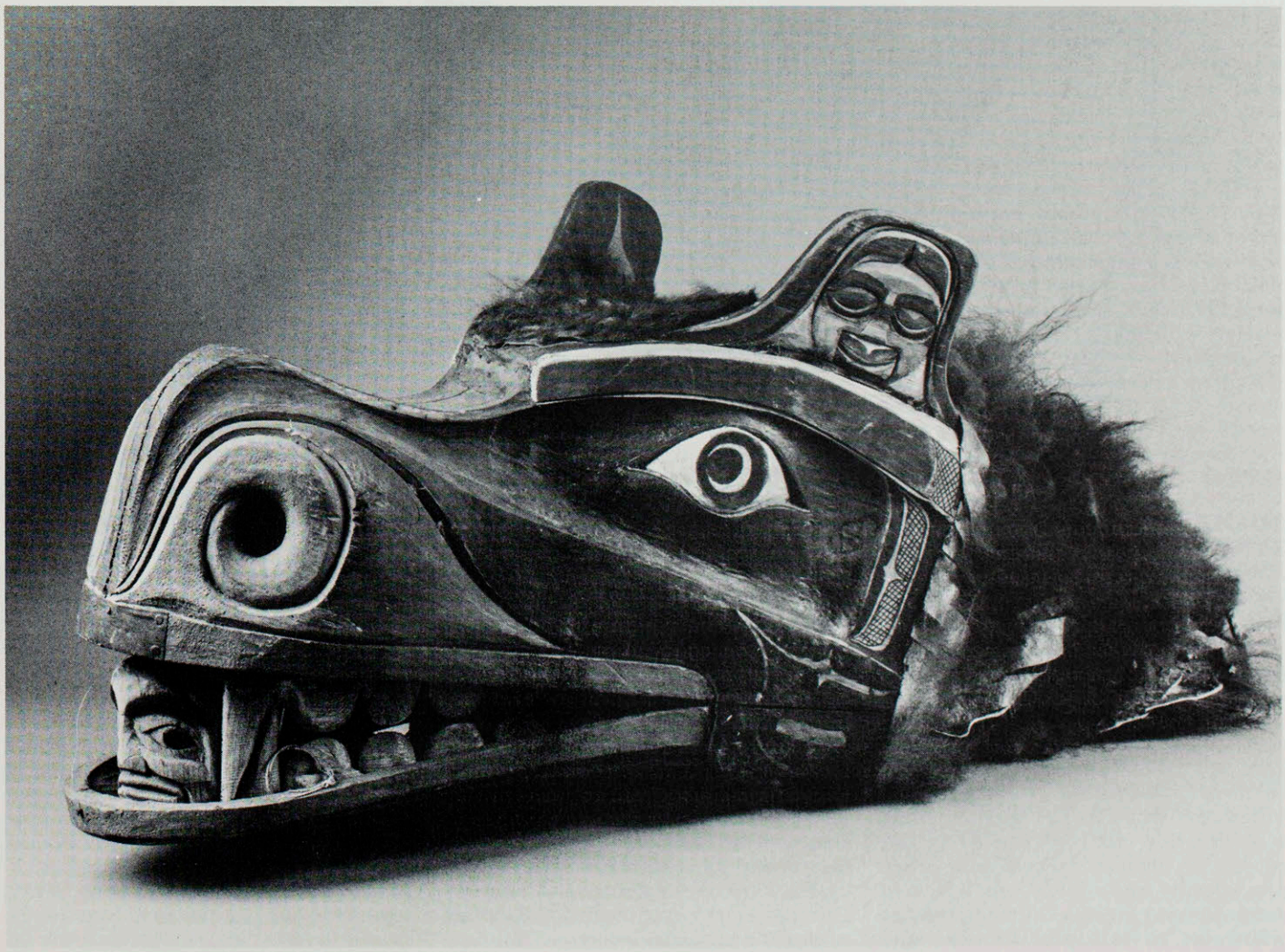
Linguistic evidence as well as legend seem to point to a tradition of interior peoples migrating and adapting to a coastal existence. The mythology of the region recalls ancestral homelands, many far from their present villages. Tlingit legends tell of an ancestral home at the head of the Nass River, while Tsimshian mythology recollects their home at the head of the Skeena River. Both groups recount tales of perilous journeys of their mass exodus from the interior to the mouths of these rivers. Hostility between the two groups ultimately resulted in the Tlingit being forced farther northward by the Tsimshian until they came to occupy their present location in the vicinity of the modern city of Juneau, Alaska.

Records kept by European explorers and Russian fur traders during the eighteenth century provide us with the first descriptions of Northwest Coast culture. Journals kept by Cook, Vancouver, LaPerouse, Malaspina, and Meares, to name a few, tell of encounters with flourishing populations of native peoples well-adapted to their marine environment. Sketches made by artists accompanying these expeditions reveal the existence of a sophisticated and fully-developed art form. Further contact with Europeans and acceptance of western trade goods seemed to stimulate this tradition. Although some metal tools were known aboriginally, the influx of great quantities of metal and other European goods caused Northwest Coast artistic production to accelerate and reach its peak around 1880 in the north and somewhat later (1920) in the south. It was during this heyday of artistic production that the objects in this exhibit were made and collected.

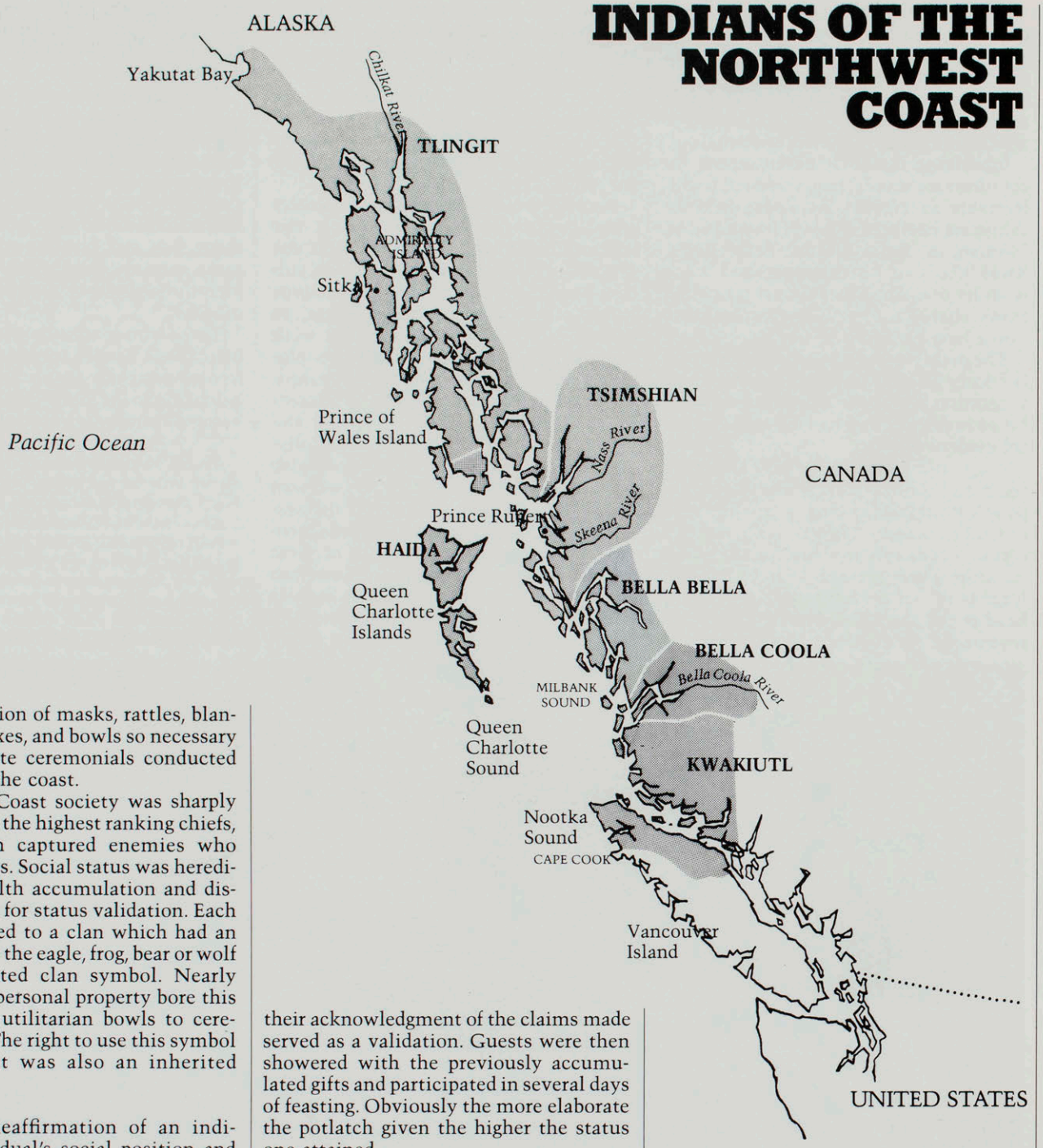
Full exploitation of the abundant natural resources of the region enabled the near attainment of high civilization by a completely nonagricultural people. Most of the summer was spent in temporary camps at the mouth of salmon streams. By harvesting great numbers of these fish and hunting other available game animals, the Indians could store a plentiful supply of food for the winter months.

These winter months were spent in the huge plank houses constructed on beach fronts facing the ocean. Several families belonging to the same clan occupied each house. Winter was a special time devoted

VISOR MASK, *Kwakiutl. Wood, twine, metal, bear fur, red, green, white, blue and black pigment, 91.0 cm long. Collected by George Hunt in 1897 at Fort Rupert. Such masks represent a grizzly bear spirit known to the Kwakiutl as dluwalakha. They were worn by dancers who were dressed in a bear fur costume. The dances were comic in nature and took place during lulls in the Hamatsa Society ceremonies.*



INDIANS OF THE NORTHWEST COAST

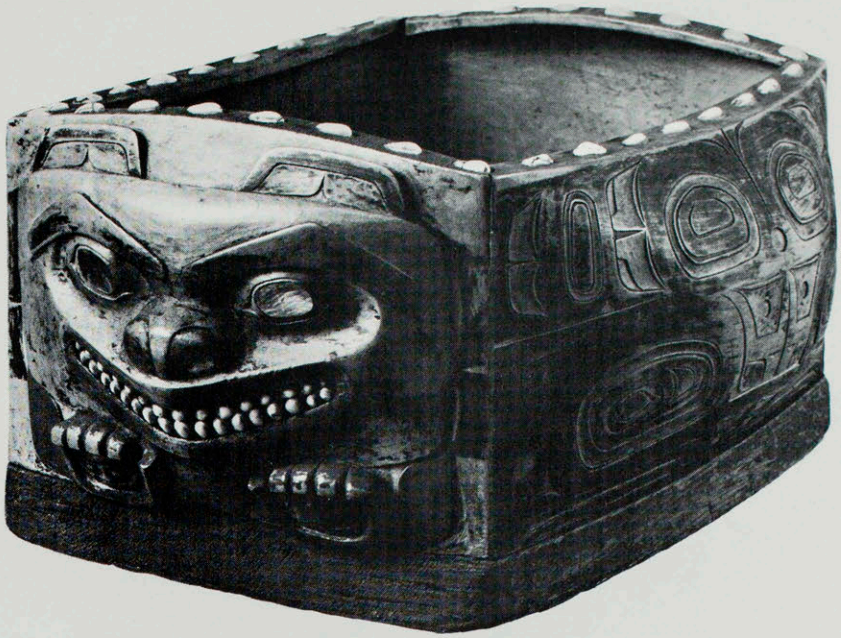


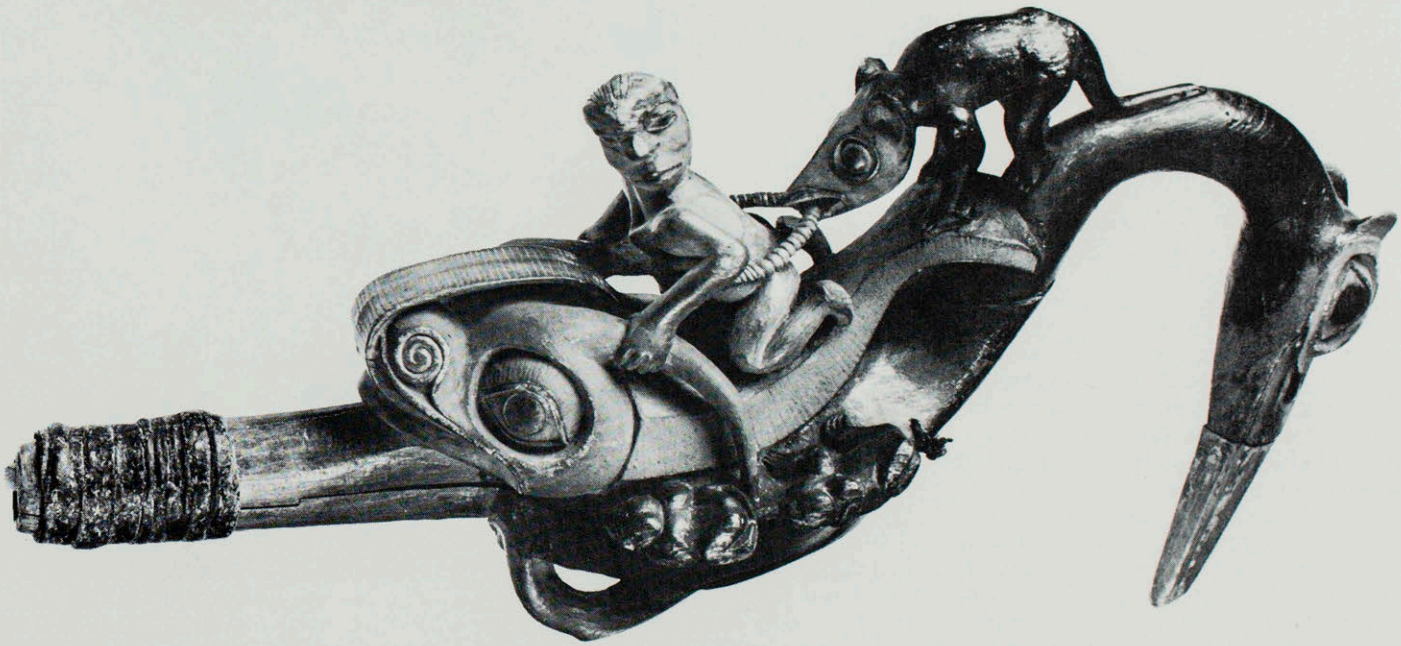
to the production of masks, rattles, blankets, staffs, boxes, and bowls so necessary to the elaborate ceremonials conducted up and down the coast.

Northwest Coast society was sharply stratified from the highest ranking chiefs, down through captured enemies who served as slaves. Social status was hereditary with wealth accumulation and display necessary for status validation. Each person belonged to a clan which had an animal such as the eagle, frog, bear or wolf as its associated clan symbol. Nearly every item of personal property bore this symbol, from utilitarian bowls to ceremonial wear. The right to use this symbol and display it was also an inherited privilege.

SOCIAL STATUS AND CEREMONIAL LIFE Reaffirmation of an individual's social position and validation of his inherited rights and privileges was continuously required. This was accomplished through the giving away of property at a "potlatch." Over a period of several months or even years, a chief would accumulate large numbers of valuable items such as finely-woven blankets or elaborately-carved boxes and bowls in anticipation of the potlatch. When enough goods had been amassed, a neighboring clan was invited to participate as guests. Speeches were made proclaiming the chief's position and accompanying rights. Guests served as witnesses to this proclamation and their acknowledgment of the claims made served as a validation. Guests were then showered with the previously accumulated gifts and participated in several days of feasting. Obviously the more elaborate the potlatch given the higher the status one attained.

To the Kwakiutl, winter was a sacred season—the time of the winter ceremonials when the spirits dwelt among the people. The focus was upon a mythical time when supernatural beings inhabited the world. The Kwakiutl had a series of secret dancing societies, the highest order being that of the Hamatsa or cannibal dancer. The initiation of young boys into these societies was the beginning of the winter ceremonials. Individuals often sought help from supernatural powers represented by such natural phenomena as the sun, stars, plants, and animals. Dramas were staged utilizing elaborate masks and costumes.





THE ROLE OF THE SHAMAN Many of the artifacts in this exhibit were used by shamen, or medicine men. Extremely powerful, they had the ability to cure sickness as well as cause it. The road to becoming a shaman was generally through an apprenticeship to an already-practicing shaman.

Shamen generally lived on the fringe of Northwest Coast society, let their hair grow and never combed it. This unkempt appearance was a badge of office. Shamen were paid for their services and often became wealthy. Far greater than their material wealth, however, was the respect mixed with fear that they commanded. Manifestation of this fear was evidenced by the aversion of the community to associate with shamen on a day-to-day basis as well as insisting upon their burial far from a village.

On the Northwest Coast it was commonly believed that illness was caused either by soul loss or by a foreign substance invading the body. It was the shaman's job to either recapture the soul or to rid the body of the foreign matter. This was accomplished by public ceremonies often involving chanting, dancing and a variety of magical tricks.

Objects used by shamen during these rituals bore decoration emphasizing supernatural creatures rather than clan symbols. Many of the masks, rattles, puppets and soul catchers in this exhibit were a part of a shaman's curing paraphernalia.

TOP

BENTWOOD BOWL, *Tlingit. Wood, operculum, haliotis, twine, red, black and blue pigment, 16.5 cm high. Collected by G. T. Emmons between 1882–87 at Chilkat. The carving represents a brown bear.*

ABOVE

SHAMAN'S RATTLE, *Tlingit. Wood, twine, rawhide, black, red and green pigment, 32.5 cm long. Collected by G. T. Emmons before 1904 at Angoon, Admiralty Island. The three figures carved on the back of this oyster catcher rattle represent some shaman activity or legend. Drucker has described the scene as showing "a person pursued by a wolf escaping on the back of a sea monster," while Emmons states it represents "an otter tying a witch spirit with a rope of twisted bark."*

FACE MASK, *Haida. Wood, animal hide, nails, twine, white, blue, black and red pigment, 23.0 cm high. Collected by G. T. Emmons between 1884–93 on Prince of Wales Island. Two different aspects of a spirit, perhaps male and female, are shown by this transformation mask.*

THE CARVER'S ART The Northwest Coast carver, always a man, worked in a variety of materials including wood, mountain goat and sheep horn, ivory, bone and copper. With enormous forest resources, wood was obviously the most prevalently worked material. Red cedar, with a fine, even grain, was easily carved. Boxes and chests were made of a single piece of wood by kerfing the corners and steaming the wood to enable it to be bent to the desired shapes. Mountain goat and sheep horn were similarly steamed to produce large ladles and spoons. Embellishment of carved pieces was accomplished by paints or by the inlay of copper, abalone shell, or snail opercula. Additionally, animal fur or sea lion whiskers could serve as further adornment.

To us, totem poles are probably the best-known examples of the carver's art. Conspicuous because of their size, they served a variety of functions. Some were carved with the clan symbol to serve as roof-supporting house posts. Some served as mortuary poles detailing the life history of an important chief and might also hold his coffin. The majority of poles served to recount clan histories, telling of their origins and reaffirming their status within Northwest society. Ironically, this largest example of Northwest Coast art has survived very poorly. The heavy rainfall and damp climate quickly destroy these giants and cause their decay within 50 to 75 years. A large memorial pole nearly eight feet tall and carved to represent a beaver was acquired by the American Museum in 1881 and is an exciting part of this exhibit.

In the nineteenth century, as a direct result of European contact, two new materials were added to the carver's art: argillite and silver. Beginning around 1820 argillite, another name for a soft slate, began to be quarried on Queen Charlotte Island. Carved only by the Haida for the tourist market, such items as plates, pipes, bowls, and miniature totem poles were produced. Silver coins introduced by Europeans were transformed by the Indians into bracelets and pins.

Native travel along the Northwest Coast was accomplished by means of large canoes. Constructed from a single log, the interior was hollowed out and then the sides steamed, softened and widened. Once finished, some canoes could hold as many as 50 people.

THE WEAVER'S ART Women, prevented from being carvers, produced exquisite art forms of their own by weaving fine baskets and blankets. Split spruce root adorned with dyed grasses and maidenhair fern were transformed into magnificently twined baskets and hats.

The so-called "Chilkat blankets" were a combined effort of men and women. Pattern boards were painted by the men with the exact design required. It was then up to the women to reproduce this complicated pattern in weaving. The warp threads were a combination of mountain goat wool and shredded cedar

FACE MASK, *Bella Coola. Wood, cedar bark fibers, feathers, metal staples, white, blue, red and black pigment, 66.0 cm high. Collected by Franz Boas and George Hunt in 1897. Boas identifies this mask as representing the sun.*

CHILKAT BLANKET, *Tlingit. Mountain goat wool, cedar bark, animal hide, black, yellow and blue pigment, 152.0 cm wide (top). Collected by I. W. Powell in 1881, H. R. Bishop collection. Worn about the shoulders during dances, these blankets helped produce a very rhythmic effect as the fringe swayed with the dancer's movements. The extremely abstract designs often could only be interpreted by the owners.*

bark for added stiffness while the weft lacked this bark reinforcement. Pattern dictated that many round shapes be woven separately and later assembled into the finished product. Like other Northwest Coast art forms the blanket designs were highly stylized with strict color requirements: turquoise, yellow, black, and white. Before the advent of aniline dyes, natural dyes available to the women included hemlock bark to produce black, copper and urine to produce turquoise, and moss and lichens to obtain a yellow color. Two examples of the art form are included in this exhibit.

HISTORY OF THE COLLECTION Many Northwest Coast collections exist today in museums as well as in private hands around the world. The reasons for the significance of the American Museum's collections are threefold: 1) size, 2) age, and 3) documentation. Of the tens of thousands of pieces of Northwest Coast art housed there, most were collected in the nineteenth century when the art still flourished on the coast. Furthermore, over ninety percent of those pieces are documented, thanks to the meticulous habits of their collectors.

Shortly after its founding in 1869, the American Museum of Natural History began actively seeking to formulate a representative Northwest Coast collection. Financing for the venture came from H. R. Bishop, a New York businessman. For the grand sum of $2,500, I. W. Powell, the superintendent of Indian Affairs in British Columbia, was able to collect and document 791 pieces for the Museum.

Lt. G. T. Emmons, USN (1852-1945), spent the greater part of his life on the Northwest Coast developing his interest in its peoples. He single-handedly collected more material (5,200 objects) for the American Museum of Natural History than did any other person, and kept detailed records regarding the place of origin of each piece, its use and any associated myths. Even though he was not a trained anthropologist, his many scholarly works on the Tlingit Indians still stand as standard references on the subject.

The collecting efforts of these two people had focused primarily on the Tlingit, Haida and Tsimshian peoples with very little Kwakiutl material represented. Franz Boas, famed anthropologist, began to fill this void soon after his arrival on the Museum staff in 1895. Boas convinced the Museum's president, Morris K. Jesup, of the need for a North Pacific expedition. A number of distinguished anthropologists, archaeologists and linguists agreed to participate with Boas among them. The result was the publication of many scholarly works by the participants and the acquisition by the American Museum of Natural History of several thousand more Northwest Coast specimens.

Since then the Museum has continued to add to its Northwest Coast collections

but at a reduced pace. The significant decrease in availability of good pieces and the attendant high prices for those pieces have caused most museums to lose out on many fine artifacts.

The American Museum of Natural History has generously agreed to share some of its extraordinary collections with us by circulating this exhibit. Thanks to the energies and foresightedness of such men as Emmons, Bishop, and Boas, we can all experience the richness of Northwest Coast life through its surviving art.

The quote from Bill Reid from which the exhibition's title is derived sums up this vitality:

> "It is easy to become entranced by the soft curtain of age, seeing this instead of what it obscures. An ugly building can make a beautiful ruin, and a beautiful mask in the dark of many years, softened by wear, becomes a symbol which tells us that the cycle of life, death, decay and rebirth is a natural and beautiful one.
>
> This is not what their creators intended. These were OBJECTS OF BRIGHT PRIDE, to be admired in the newness of their crisply-carved lines, the powerful flow of sure elegant curves and recesses—yes, and in the brightness of fresh paint. They told the people of the completeness of their culture, the continuing lineages of the great families, their closeness to the magic world of universal myth of legend."

STANDING FIGURE, *Tlingit. Wood, hair, bird bone, animal hide, red and black pigment, 17.8 cm high (exclusive of hair). Collected by G. T. Emmons between 1882–87 at Chilkat. The figure represents a shaman. Although Emmons suggests its use as a child's doll, it is undoubtedly a shaman's accessory.*

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All books available in the Museum Book Shop.

Nancy Blomberg is Assistant Curator of Anthropology at the Natural History Museum. Prior to coming to Los Angeles Ms. Blomberg was Curator of Collections at the Anchorage Historical and Fine Arts Museum, Anchorage, Alaska. She has conducted research among both Northwest Coast Indian cultures and Alaskan Eskimos.

PACIFIC FRONTIERS

by Donald Chaput

Early in this century, the historian Hubert Howe Bancroft in *New Pacific* wrote that "pioneer work in the United States is done, and we must take a plunge into the sea." Both parts of Bancroft's sentence can be questioned. Many would argue whether "pioneer work" was finished in this country. Furthermore, to our point, Bancroft seems to have assumed that prior to this era, the United States had taken little interest in the Pacific Ocean.

By the time of our nation's birth in the 1780's, Yankee commercial interests were already familiar with parts of the Pacific. In the first decades of the next century thousands of islands and many portions of the Asian and Australasian mainland were discovered and explored by whaling and sealing ships. By mid-century, this was a Pacific nation. The Mexican War led to our acquisition of California, and in the 1850's Commodore Perry succeeded in opening the Japanese ports for commercial and diplomatic contacts. The United States also acquired the Washington-Oregon region and purchased Alaska. By the 1890's hundreds of American vessels were in the Pacific, transporting commercial products, missionaries, teachers, and armed forces.

By the turn of this century we were indeed a Pacific power. We acquired the Philippines, Guam, and Hawaii, and with other powers participated in the Boxer Rebellion in China. So Bancroft's directive to "take a plunge into the sea" was indeed tardy; we had been swimming for years.

This United States presence in the Pacific has interested the History Division staff for years, and in the early 1970's we began to discuss an exhibit which could focus on this aspect of our nation's history. The Museum collections are rich in Pacific materials; it was a matter of creating an appropriate theme that could utilize the material and at the same time present something reasonable and meaningful about this nineteenth-century experience.

As part of the planning, several curators began to work on lists of items and ideas, and in 1975 I spent a few months in the Philippines, with a side trip to Taiwan. In the following year we held a series of curatorial meetings, which included members of the Exhibits and Education divisions. We also profited from a several weeks visit by Research Associate Raymond Quetchenbach. Dr. Quetchenbach is director of the Leyte-Samar Museum in the Philippines.

Our exhibit title implies the 1800's; *Pacific Frontiers: From the Louisiana Purchase to the Spanish-American War.* However, we decided to include background material that would set the stage for our involvement and some twentieth-century material that should show the impact of this involvement.

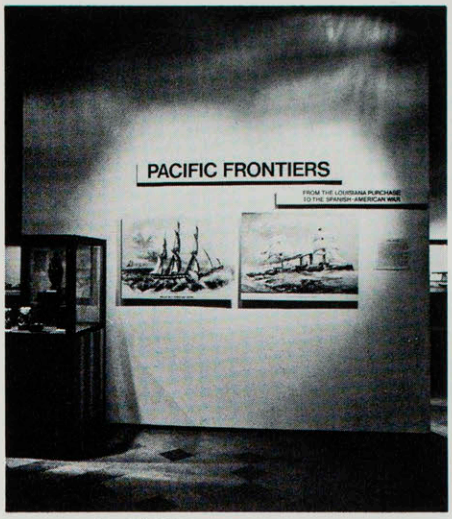
The theme of the exhibit is the impact of this Pacific awareness on the lives of the people in Asia and in the Americas. Rather than looking from a perspective of the United States scanning the ocean, we felt that the increased contacts in the Pacific should be viewed from both Asia and the Americas. The word interchange, used several times in the exhibit, best expresses our goals.

In an exhibit it is often difficult to measure and demonstrate ideas and concepts of such an interchange, but there are many ways in which the material culture can be displayed. One of the leading exchanges was, of course, people. By the end of the nineteenth century, tens of thousands of American military personnel, missionaries, merchants, and tourists had visited or opted to live in the Pacific. At the same time the Gold Rush, road construction, and farming in the western United States had attracted thousands of immigrants to this country, mostly from China, the Philippines, and Japan.

The printed word can give another measure of this interchange. Novels, newspapers, travel guides, and tracts proliferated, not only to acquaint the newly-arrived Americans in the Far East, but also to familiarize the people of the United States with her new Asian residents. Examples of this are *The American,* a newspaper published in Manila, American novels with an Asian theme, sheet music published in this country on Far East subjects, and a Chinese language newspaper published in San Francisco.

The exhibit, opened in May of 1977, is located on the main floor of the Museum at the west end—the Pacific end—of the building. The gallery is spacious, divided into three large segments. In the first portion we include materials related to discovery and exploration in the 1500's, whaling, sealing, and general maritime developments, and several cases highlighting the many scientific expeditions of the early 1800's. The Mexican War, Gold Rush, and early population growth of our Pacific Coast are also interpreted here. In the same section are memorabilia, including a large portrait of General Harrison Gray Otis. Over fifty pieces of the Otis Collection are used in this exhibit, and in many ways Otis was the embodiment of the growing United States awareness of the Pacific. He began his journalism career in Santa Barbara in the 1870's, spent several years as government agent on the Fur Seal Islands, Alaska, and in 1882 purchased the Los Angeles *Times.* During the Spanish-American War he was appointed a general of volunteers and figured prominently in the key campaigns of 1899 in the Philippines.

The second portion of the gallery, along the west wall, highlights the trip of Commodore Perry to Japan in the 1850's. By the use of artifacts, maps, and books, we see not only how the United States viewed Japan, but also Japanese concepts of the strangers from America. The east wall stresses the native cultures of Hawaii and Alaska, as well as the maritime, mining, and political activities in those regions that had become so im-



portant by 1900.

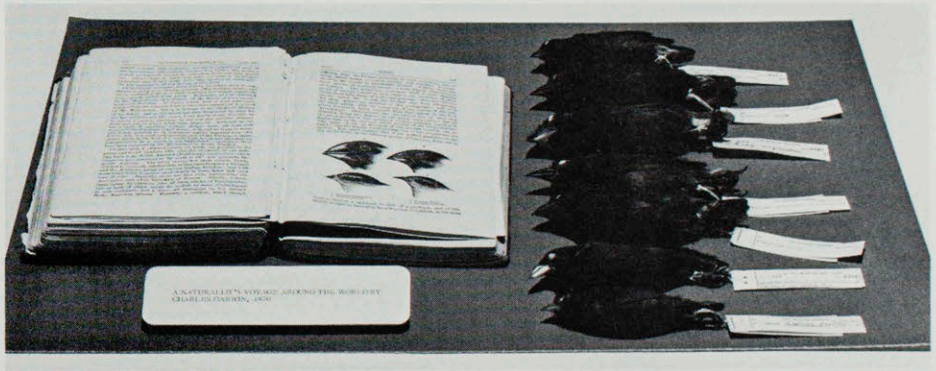
The third section of the gallery emphasizes the events at the turn of the century. Here, with the New Imperialism, we see the United States politically and militarily involved in China, the Philippines, and Guam. The United States' interests in the Far East, and the local response, whether hostile or friendly, are presented. The remainder of this section is indeed a potpourri of cultural contacts between two continents. In addition to common merchandise that began to be exchanged, we also show the influence of immigration, and the changes in clothing, furniture, architecture, and publications in America because of this Asian contact.

Although this is a History Division exhibit, "Pacific Frontiers" is really an inter-disciplinary affair. Most of the cultural materials of the South Seas and Alaska are from the Anthropology Section; Mineralogy provided gold and other specimens of the scientific expeditions; Ornithology made the Darwin expedition more relevant to the visitor by providing a series of finches that helped Darwin develop his evolutionary theories; Botany supplied the California poppy and other plants of the Pacific; Herpetology provided several important lizards; Malacology supplied appropriate sea shells; and Mammalogy supplied a large fruit bat.

Although this is a temporary exhibit, we have decided to retain it at least through 1979. Increasing numbers of school classes are finding the exhibit useful, and the words from other visitors have been encouraging. We feel that the significance of this Asian-American interchange justifies another year of public viewing.

Donald Chaput, Curator of Political and Military History at the Natural History Museum, has shared the genesis of an important exhibition with TERRA's readers.

The early lure of the East, spices, had become a massive worldwide business by the turn of this century. Today these spices are common in the kitchen, but for centuries they were sought and considered exotic and lucrative prizes by European nations. Walter Raleigh wrote in 1605: "In all the dreams of the politicians, merchants, sailors and geographers, who pushed back the limits of the unknown world, there is the same glitter of gold and precious stones, the same odour of far-fetched spices."



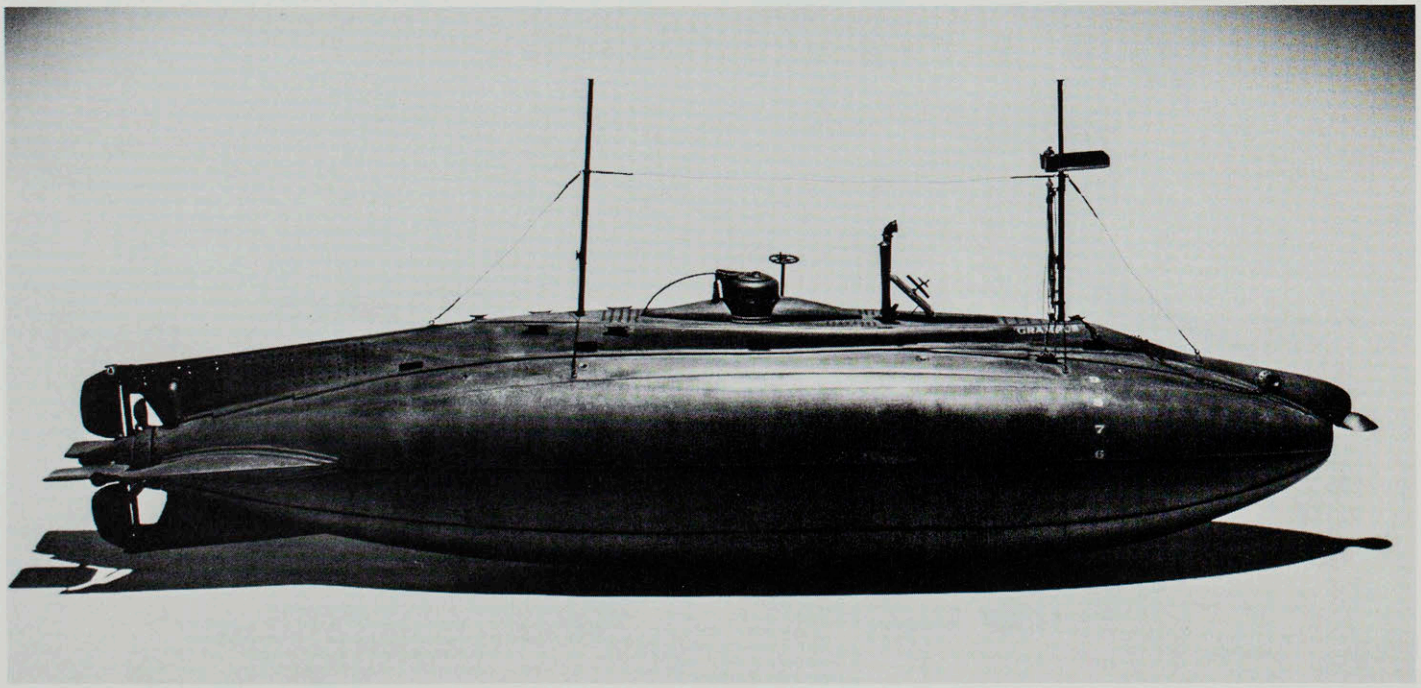
Photos by Larry Reynolds

During the Age of Discovery, mariners often wrote about the natural wonders of the places they visited. However, it wasn't until the eighteenth century that naturalists were included regularly in expeditions. The lands bordering the Pacific Ocean were among the last to be visited by the Europeans. These regions were rich in natural history and in a letter home from Lima, in 1935, young Charles Darwin wrote: "I look forward to the Galapagos with more interest than any other part of the voyage." Later, in his journal, he speculated whether "one species had been taken and modified by different ends," after noting "the gradation and diversity of structure of one small, intimately related group of birds." He was referring to the finches above, living on several of the Galapagos Islands. These speculations later helped Darwin to formulate his theory of evolution.

Harrison Gray Otis, a captain in an Ohio regiment in the Civil War, moved to the Pacific Coast in 1876. Until his death in 1917, he was an active promoter of Americans' expansion into the Pacific. After a few years as publisher of the Santa Barbara Press, *Otis served as United States government agent in the Fur Seal Islands, Alaska (1879–1881). He then moved to Los Angeles, where he gained controlling interest in the* Times. *At the outbreak of the Spanish-American War in 1898, Otis volunteered his services to his Civil War comrade, President William McKinley, became a brigadier general of volunteers and went to the Philippines. Soon after the Filipino Revolution erupted early in 1899, Otis led a brigade of troops which figured in the key United States victories at Caloocan and Malolos. More than fifty pieces in the Pacific Frontiers exhibit are from the Otis collection, donated to the Museum in the 1920's.*

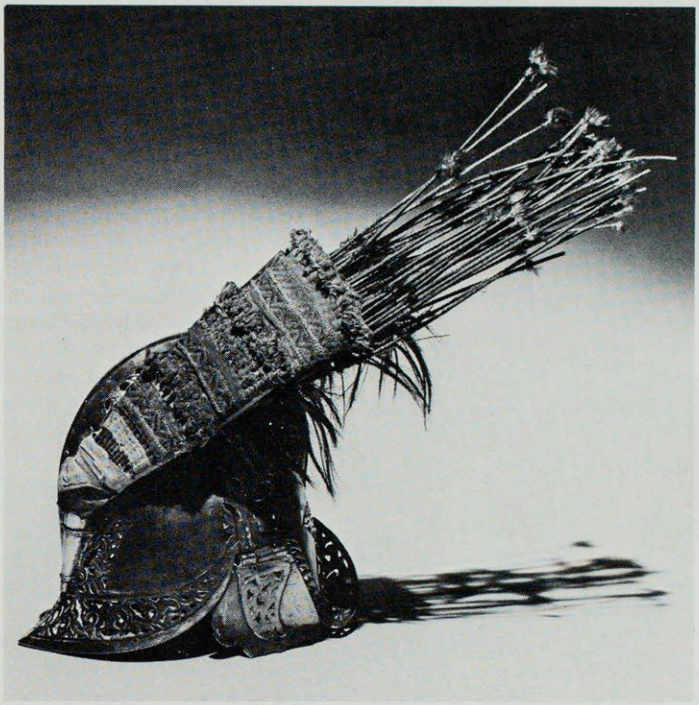
Hawaii, discovered by British Captain James Cook in 1779, soon became an important trading and provisioning point in the mid-Pacific. By the 1820's, American whalers made the islands a regular stop, and in the same decade American Protestant missionaries began to establish churches and schools. Within a few decades, American influence was paramount, controlling most sugar and shipping interests. The Hawaiian royal family continued in nominal rule until 1893, when factions close to the United States organized a revolution and set up a republic. In 1898 Hawaii was annexed to the United States, receiving territorial status in 1900. These political acts merely confirmed what had been reality for the past fifty years. In the case illustrated are included taro root, a starchy tuber which is a staple of Hawaii and other Pacific tropics; a coconut, which has been a source of food and shelter in all of Oceania; a Hawaiian Koa wood bowl; a tapa beater, tapa being an unwoven cloth made from the inner bark of a tree; and sugar cane, once the great money crop of Hawaii.

Japanese Samurai (warrior) doll from the late 1800's.

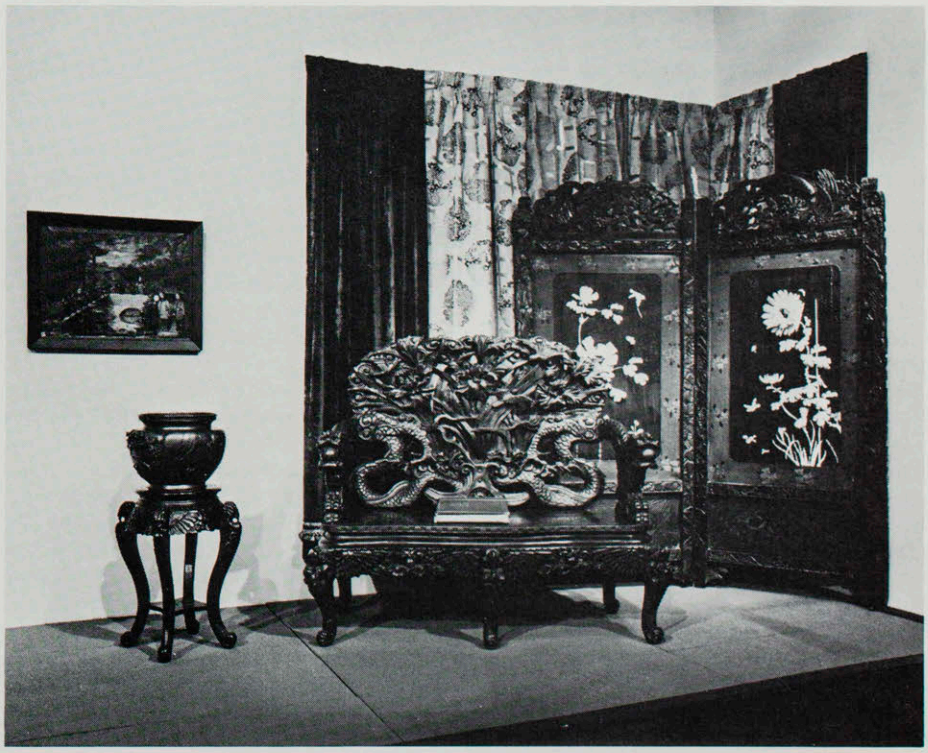


A CENTURY'S CONTRAST. The Chinese junk, Ning-Po, *built in the early 1800's, was put to military, slaving, and smuggling uses. In 1913, while docked at San Pedro, she sank during a storm.*

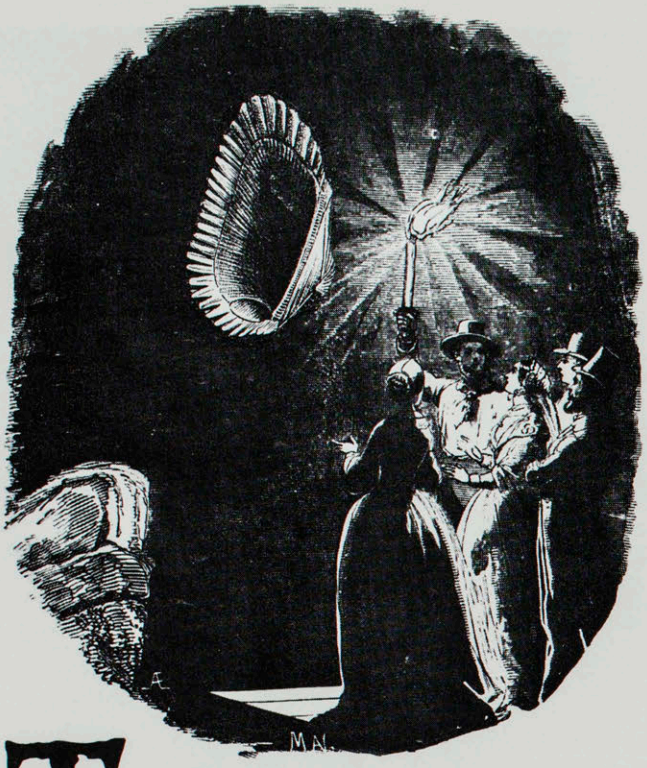
The submarine, Grampus, *was built at the Union Iron Works, San Francisco, 1901–02, the first such vessel to be launched and operated in the Pacific waters. The first commander of the seven-man crew was Lt. Arthur MacArthur, U.S. Navy, brother of Douglas MacArthur.*



The suit of Moro armor with helmet comes from the family of Captain Richard A. Preston, as do all of the Philippine constabulary pieces in the exhibit. After serving in China, Preston was assigned to the Philippines, where from 1901 to 1909 he was captain and senior inspector of the constabulary. The helmet is brass; the armor is chain mail and carabao horn. It is typical Moro (Muslim) from the southern Philippines and shows a blend of Arabic and Spanish influences.



During the nineteenth century a fascination for the exotic East developed, which was reflected in a variety of home furnishings and personal articles. By 1900, most of the Asian mainland and islands of the Pacific were claimed, owned, or controlled by the United States, Japan, and European countries. This contact with Asia and the Pacific islands led to major changes in the United States. Large numbers of Asian immigrants came here, and the Oriental influence in art, architecture, and consumer products was noticeable.



TO SOME ONLY A CLAM

by Edward C. Wilson

SCENARIO: A fossil clam guides geologists across the towering Sierra de la Giganta of southern Baja California to a phosphate deposit on the shore of the Gulf of California. The phosphate is used to fertilize crops all over Mexico, increasing their yields, lowering the cost of food, providing employment in the agriculture, construction, mining, manufacturing, and transportation industries, and reducing the Mexican balance of payment deficit through increased export and reduced import of food.

Interesting, if true, as Miss Gertrude Stein once said.

Many years ago, in a far southern California city, I arrived from Berkeley with a new PhD degree to occupy a curatorship at a small, but venerable, natural history museum and soon was taken up socially by a couple of Beautiful People. They supported the museum, where she was a docent, and they gave big, splashy parties at which the young F. Scott and Zelda would have been at ease.

For a time, this couple dedicated themselves to save me from becoming one of the curators stereotyped as "little gray men in the attic."

On one notable occasion, we were accompanied by a lady well-known as curator of anthropology at another museum. The evening began with body surfing on the Silver Strand, progressed through dinner on the deck of their canyon-edge home, was followed by several hours dancing at a club, and ended, barefoot, on the beach before the Tijuana bullring, where we watched the sunrise while taking cognac from Baccarat snifters.

There, frivolity palled and we talked seriously of museums, naturally from very different viewpoints and backgrounds. The hostess proposed the topic that research is an unnecessary nuisance to museums. Then her husband put the ultimate dread question: "Who needs natural history museums?", clearly meaning, is their existence justified? The subject having been established, we set to defending or attacking it before reaching the predictable pseudointellectual resolution that there *was* no resolution and the value of the discussion lay in the exchange of ideas.

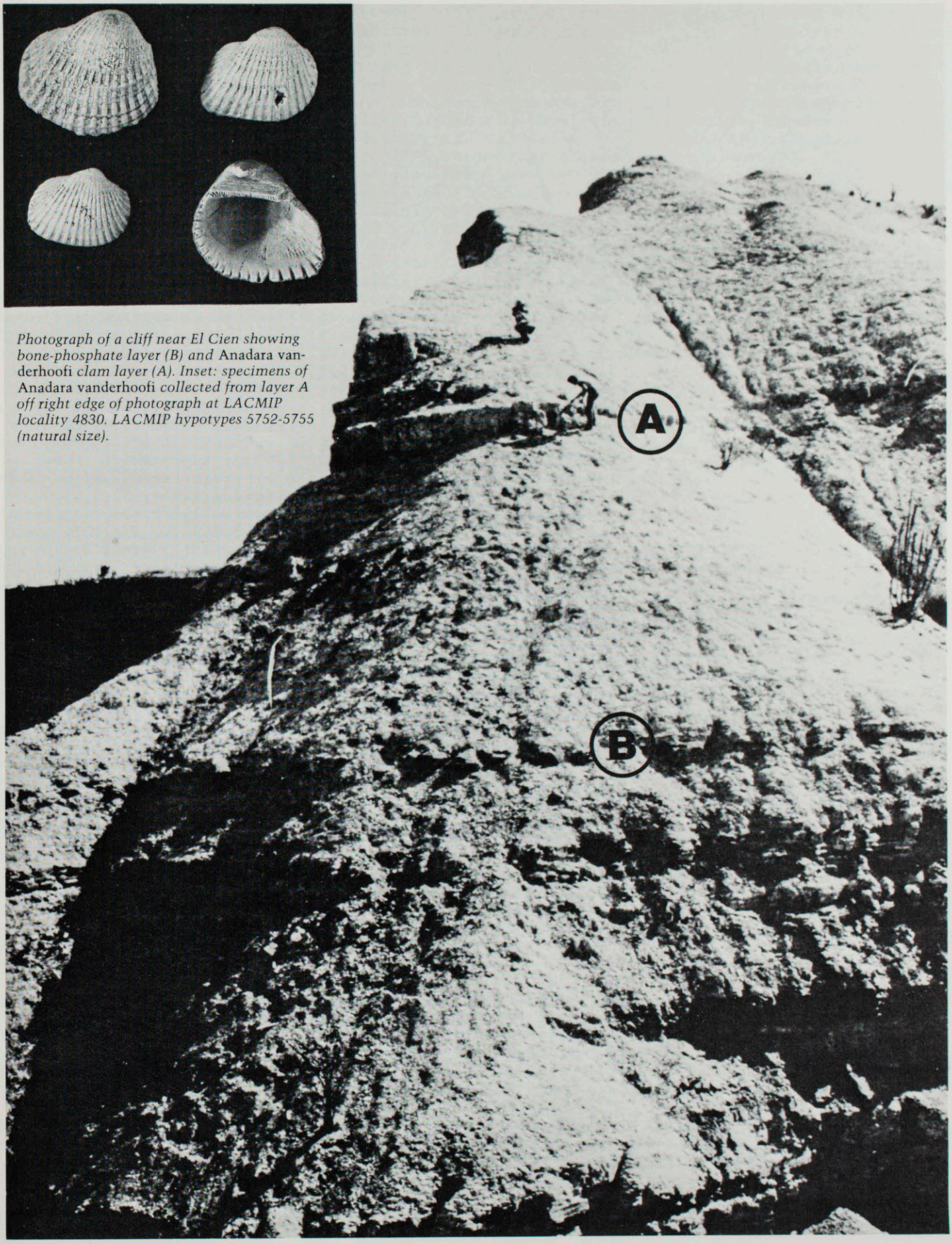
Normally, questions such as this arise privately and should be answered privately, but in the summer of 1978 it arose very publicly when, during a budget crisis, some officials of Los Angeles County openly proposed to cease funding its Natural History Museum and close it. Fortunately, with commendable work by our then director, Dr. Giles Mead, and concerned citizens, supported by prestigious international scientific societies, that proposal was modified and the Museum still functions, but the specter haunts me yet. I would like to share some reasons for the desirability of having natural history museums, and give a recent example about the practicality of "pure" research.

The major functions of a serious natural history museum can be classed under four categories, for which the acronym RARE might be used as a memory aid, representing research, acquisition, repository, and education, not necessarily in order of priority. The latter three are understood by everyone and can be reduced simplistically to getting things, taking care of them, and putting some of them where docents and others can lecture about them and the public can see them. The importance of these three is not diminished by their obviousness. The value of research, however, is not so apparent. In the very long run, it certainly is the most lasting, since displays, collections (alas!), and even buildings disapperar, but the publications issuing from researchers continue to be read in libraries throughout the world and result in our incredible fund of knowledge about life and the universe. Research deserves the support and encouragement given the other three functions.

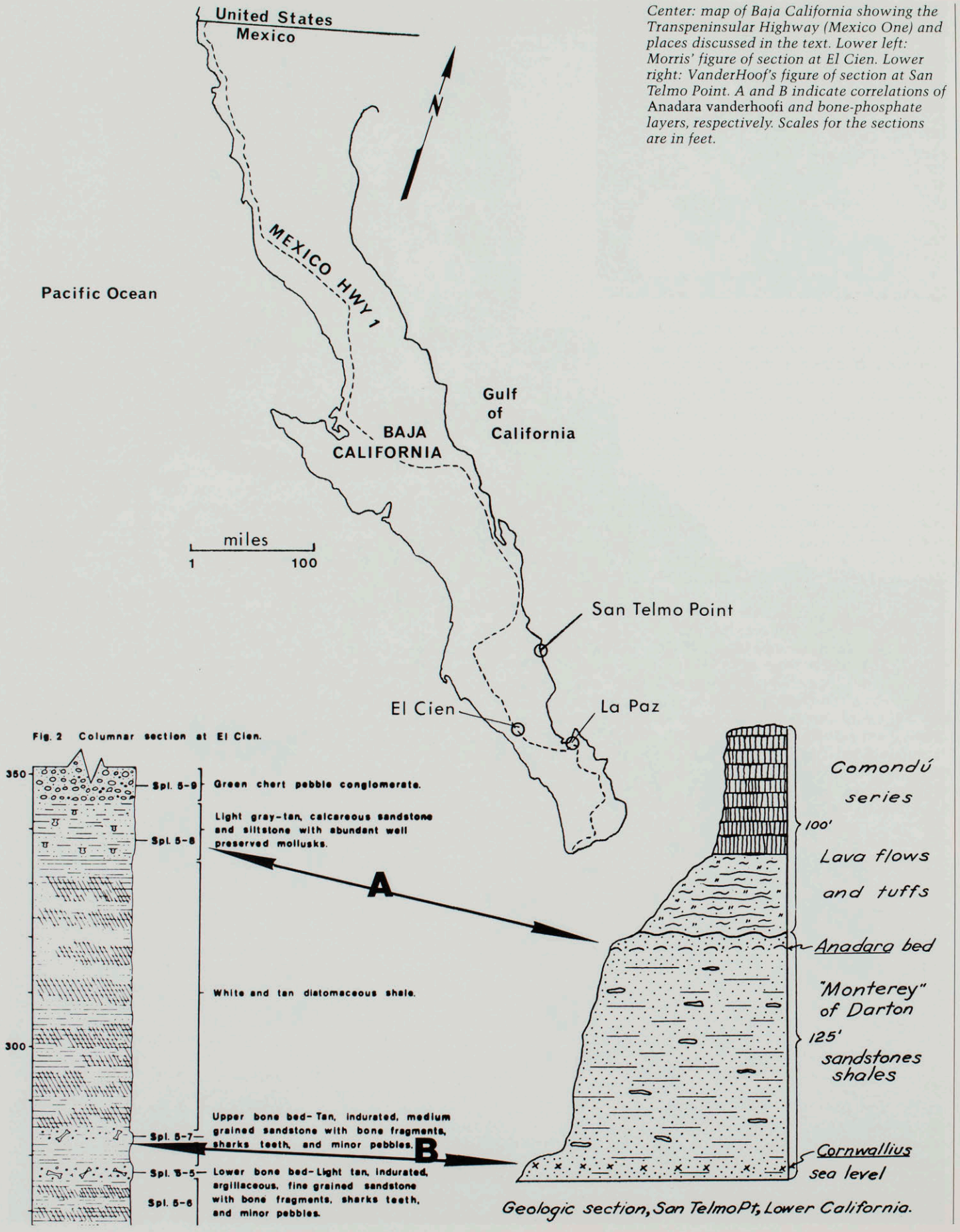
The quality of life in the few cities fortunate to have great natural history museums is the richer for it. Happily, Los Angeles is among them.

Now, the example of a practical application of research. If you are game-prone, identify occurrences of RARE as you read.

In 1940, the schooner, E.W. Scripps, steamed into the Gulf of California to undertake a scientific survey. The seven scientists aboard represented several disciplines and voyaged 4600 miles there in sixty-five days with the ship's captain and six crew members. On one of those days, graduate student (later Professor) J. Wyatt Durham of the University of California at Berkeley was put ashore somewhat north of San Telmo Point in Baja California Sur. In the brief time before he had to return to the ship, he managed to collect some fossil teeth from rocks containing bones on the shoreline, scramble up the cliff above to gather some of the abundant fossil marine clams and a few other mollusks that he found in a layer there, and make pertinent observations.



Photograph of a cliff near El Cien showing bone-phosphate layer (B) and Anadara vanderhoofi *clam layer (A). Inset: specimens of* Anadara vanderhoofi *collected from layer A off right edge of photograph at LACMIP locality 4830. LACMIP hypotypes 5752-5755 (natural size).*



Center: map of Baja California showing the Transpeninsular Highway (Mexico One) and places discussed in the text. Lower left: Morris' figure of section at El Cien. Lower right: VanderHoof's figure of section at San Telmo Point. A and B indicate correlations of Anadara vanderhoofi *and bone-phosphate layers, respectively. Scales for the sections are in feet.*

In 1942, Dr. V. L. VanderHoof, also of the University of California at Berkeley, published a report on the teeth collected by Professor Durham, with a diagrammatic geological cross section of the cliff based on the latter's data. He showed that the fossil clams, now identified as a species of *Anadara*, known popularly as an "ark" shell, occurred about 125 feet above the fossil teeth which he determined to be those of a rare marine mammal previously found only in rocks of Vancouver Island in British Columbia.

In 1950, the results of the 1940 expedition were published in a large volume that included a long chapter by Professor Durham on the paleontology in which he erected a new species for the fossil clams from San Telmo Point named *Anadara vanderhoofi* in honor of his colleague.

In 1974 and 1975, our Museum, in cooperation with the University of Mexico and funded by the National Geographic Society, dispatched several expeditions down the Baja California peninsula along the newly finished highway that stretched from Tijuana to Land's End at the southern tip. These were paleontological reconnaissances of the rocks near the highway, places that previously had been very difficult to explore, but now could be examined with relative ease. Many significant fossils were collected, but unfortunately none from San Telmo Point, which is on the opposite coast from the highway in that part of the peninsula and was nearly as inaccessible by land in 1974 and 1975 as it had been in 1940.

Professor William Morris of Occidental College was a member on most of these trips and wrote a report (soon to be published) on the 1974 expeditions for the National Geographic Society with maps, drawings of some fossils, photographs of some localities, and geological cross sections measured at some places. One of the sections measured was slightly east of the highway near "El Cien" (The Hundred), so-called because it is one hundred kilometers north of La Paz, on the Pacific Ocean side of the peninsula. The rocks are well exposed in the arroyos and gullies of this desert area and one rock layer of particular interest had many bones of marine mammals.

In the spring of 1975, the final expedition of this series was undertaken. I was a participant, accompanying colleagues from the Museum, the University of Southern California, and the University of Mexico. We collected at many places —El Cien among them—and eventually traveled the entire length of the peninsula and back.

Upon return to the Museum, I undertook preparation and identification of the invertebrate fossils. Some fossil clams which were amazingly abundant at El Cien closely resembled the description and photographs of the ones that Professor Durham had discovered at San Telmo Point and named *Anadara vanderhoofi*, so I drove to the University of California Museum of Paleontology at Berkeley, where he and I compared them with those he had collected thirty-five years before. They belonged to the same species.

Professor Durham's clam showed promise of becoming a "guide fossil."

Now, El Cien is about seventy miles south of San Telmo Point, on the opposite side of Baja California Sur, and separated from it by the formidable volcanic peaks of the Sierra de la Giganta. Nevertheless, it seemed to me that since the rocks at El Cien were of much the same composition as reported for the ones at San Telmo Point, and since the rock layers with abundant *Anadara vanderhoofi* clams at both localities overlay rock layers seventy five to 125 feet lower in the cliffs that had numerous marine mammal bones, that perhaps we could make what is called a "correlation" in geology. This would mean that both sections were about the same age, now determined to be about fifteen million years old, from a time called the Miocene Epoch. The animals of each layer had lived in different areas on the sea floor at the same times, under such similar successive conditions that the same kinds of fossils were found in the same sequences seventy miles apart. Later in Miocene times, these conditions were terminated by great volcanic flows which were part of the geological process that has created the San Andreas Fault in California and in Mexico, opened the Gulf of California, and raised the Baja California peninsula from below sea level, exposing the rocks with fossils.

Generally, correlations are all in a day's work for paleontologists, but we had met field geologists at El Cien from the Mexican mining company Roca Fosfórica Mexicana who were prospecting nearby exposures with the marine mammal bones for phosphate to be used in fertilizer. Because the tilt of the rock layers in the area is so nearly horizontal and the desert country is cut by many barren arroyos and washes, the bone-phosphate layers are extensively exposed and would be easy to mine.

Might, I wondered, the apparently correlative layers at San Telmo Point also be rich in phosphate and have the additional advantage of being near natural harbors on the Gulf where the phosphate could be directly loaded into ships, rather than being trucked across the Sierra de la Giganta from El Cien to ships in La Paz?

With this in view, I wrote a brief abstract coauthored with Dr. Shelton P. Applegate, a participant of all the Baja trips and then on the staff of our Museum, but now Director of the Museum of Vertebrate Paleontology at the University of Mexico in Mexico City. We gave it the long title "Correlation of fossiliferous Upper Oligocene or Lower Miocene sections at San Telmo Point and Arroyo Guadalupe, Baja California Sur, Mexico, and a possible new phosphate source." It ended with the exhortation "San Telmo Point should be investigated as a possible phosphate source."

This note was printed in the abstracts of the Third Latinamerican Geological Congress held in Acapulco in 1976, where Dr. Applegate read it to the assembled scientists, showing appropriate slides of El Cien, the fossils, maps, and diagrams of the suggested correlation. In the audience was Sr. Francisco Escandón of Roca Fosfórica Mexicana. Sr. Escandón returned to La Paz and launched an investigation into the suggested correlation, at the same time examining other promising places on the Gulf of California shores south of San Telmo Point.

The results were two reports prepared by him for his company. He had found millions of tons of high grade phosphate deposits on the Gulf coast and the company has begun construction of a large, expensive plant there to process the rocks which is expected to be in operation by September 1979. Concentrated phosphate will be shipped to the factory of Fertilizantes Mexicanos, a company in Michoacán on the Mexico mainland; from there it will be distributed all over Mexico to farmers. There also is uranium in the phosphate layers in places, possibly in commercially valuable quantities. This might have amused the namesake of *Anadara vanderhoofi*, who took time off from paleontology to be a physicist for the Manhattan Project. Dr. VanderHoof is no longer alive.

Which brings us full circle to the Author's Message and something known to all scientists: useful applications of "pure" research are unpredictable. Often, scientists do not live to learn of them. It was with rare pleasure that I shared a letter with Professor Durham, written by Sr. Escandón in August 1978, beginning:

"Dear Mr. Wilson: You were right when you wrote about the possible phosphate deposits near San Telmo Point. In July, 1977, we discovered..."

It all harks back to young Mr. Durham's jaunt ashore in 1940 and his discovery and later publication of a new fossil. But, to some, it would only have been a clam.

Dr. Edward Wilson, Curator of Invertebrate Paleontology at the Natural History Museum of Los Angeles County for eleven years, cautions that collecting fossils in Mexico is under strict governmental control. Formal permits must be obtained in order to avoid the possibility of becoming involved in serious legal actions.

SPERM WHALE STRANDING IN BAJA CALIFORNIA

by Donald Patton

New Year's Day, 1979, was a tragic one for fifty-six sperm whales, which were victims of a mass stranding along a one-and-a-half mile stretch of beach about fifteen kilometers north of Mulege, Baja California Sur, Mexico. The actual strandings were not observed, but evidence suggests that the whales beached during the early morning hours. A high tide, accompanied by strong winds and heavy surf, is the partial weather report for that day.

The Los Angeles Times immediately dispatched a crew to cover the story, chartering a private plane which carried, among others, the curator of mammalogy at the Natural History Museum of Los Angeles County, Donald Patton.

Immediate observations were limited to length and sex structure of the school, gross reproductive data, and distribution of sub-groupings along the beach. Nine whales were identified as females, ranging in length from 9.7 to 12.4 m. Three of these females appeared to have aborted fetuses, none of which appeared to be full term. Of the remaining sperm whales thirty-eight were identified positively as males, ranging in length from 9.0 to 13.0 m. The largest male and sexually mature females were grouped together at the northern end of the stranded group. The southernmost sector consisted of small males occuring singly or in small groupings.

So much for the measured observations. Much more tantalizing are the theories which have been advanced to explain why cetaceans (whales, dolphins and porpoises) beach themselves and subsequently die. It may be that the leader of the group is sick or old and beaches itself just prior to dying. Other individuals accompany the leader into shallow water, and because they will not abandon the leader until its death, become stranded victims themselves.

Another explanation involves a failure in the cetacean's navigational abilities. Although the toothed whales have a sophisticated ability to echolocate (interpret sound waves bounced off underwater objects), it is known that certain types of conditions and terrain (e.g., a gradually sloping, sandy beach) interrupt or hinder the return of sound waves emitted by the animals. When faced with this sloping beach or storm surf with considerable sand and sediment in suspension, the theory is that the cetaceans are unable to detect the shore line and the exact water depth and thus accidentally strand.

Recently, parasites have been implicated in the stranding and death of solitary dolphins and porpoises. These cetaceans have a complicated system of air passages within the head, extending far back to the vicinity of the inner ear and base of the skull. Several species of parasitic worms can occupy these passageways

and, for reasons not understood, sometimes invade the brain and inner ear regions of the skull. Once in the brain, the resulting lesions and tissue damage impair the motor and sensory nervous systems of the host. It has been suggested that the parasites can also impair the function of the inner ear system, thereby reducing the dolphin's ability to balance and navigate.

However, parasitic damage has not been established in the case of group or mass strandings of large cetaceans. It seems improbable that all the whales of a school could become infected and terminally ill at the same time.

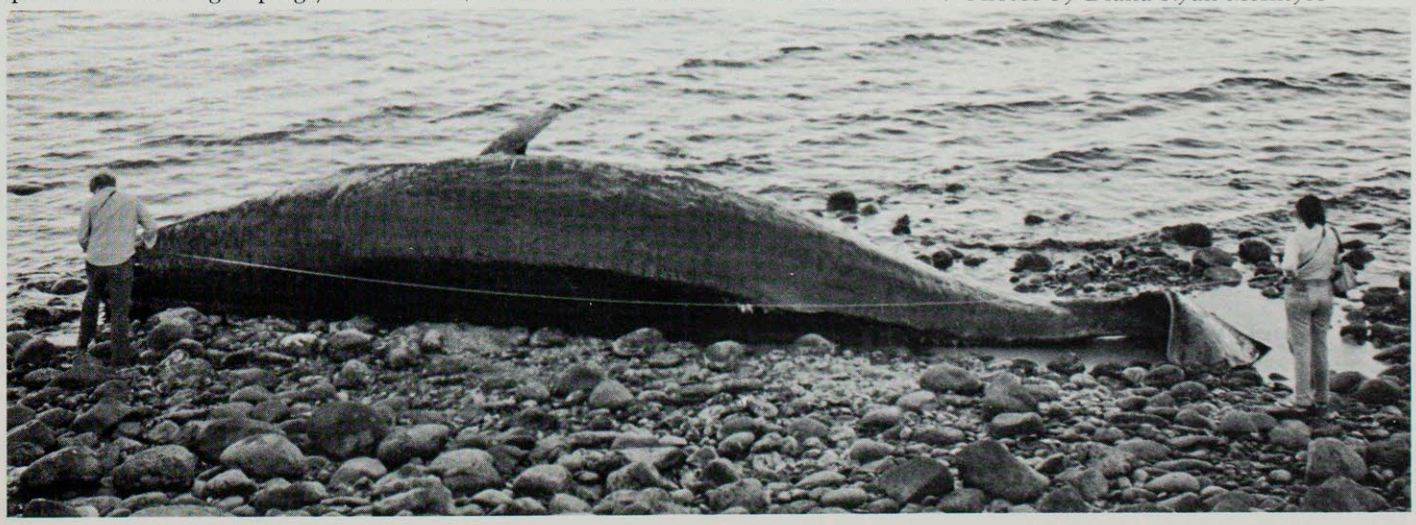
Mass strandings occur with those species of cetaceans, such as sperm and pilot whales, which are known to have complex social organizations. These species maintain groupings, known as schools, gams or pods, which are structured according to sex maturity, and hierarchical status. Evidence indicates that strong bonds develop within family or extended-family subgroupings and that assistance and attention are given to those individuals that are ill, injured or otherwise incapacitated. Observers of other sperm whale strandings have reported that the first whale to beach vocalizes what have been described as alarm or distress cries. These sounds elicit caregiving behavior from the other whales in the pod.

The stranding in question occurred along a shallow, gradually sloping coast marked by shallow bays and shifting sand dunes. Some evidence indicates that the whales were feeding upon squid and octopus in the immediate vicinity. It is possible that because of the combination of high tide, shallow water, stormy seas, strong wind and current, one or more of the whales accidentally beached and started emitting distress calls. Other individuals, while attempting to investigate or give assistance, may have, in turn, become stranded and begun soliciting assistance. In this manner, a series or chain of beachings was initiated which involved an ever-increasing number of whales, as the milling pod drifted along the coast with the strong current and wind.

A view of them was a sight not easily forgotten.

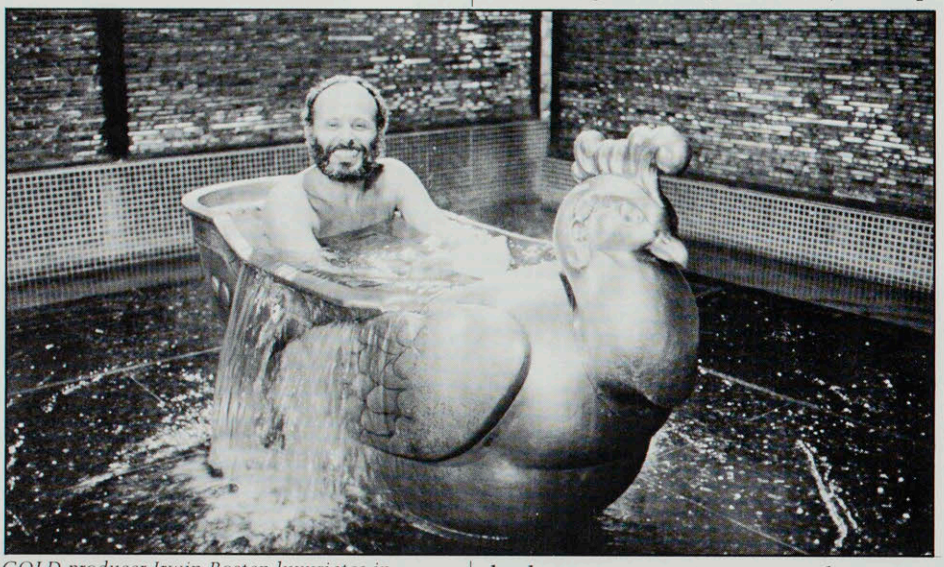
Donald Patton is Curator of Mammalogy at the Natural History Museum of Los Angeles County.

Photos by Diana Ryan McIntyre



CURATORS AND COLLECTIONS

(continued from page 2) this hour-long documentary takes a fascinating look at the precious metal and the schemes men have devised to acquire and exploit it. The special was aired nationally on PBS television January 7, and judging from its reception, will probably be repeated in the future.



GOLD producer Irwin Rosten luxuriates in a 22-karat gold tub while on location.

X-RAY DIFFRACTION LAB

The Mineralogy-Geology Section is in the process of establishing an X-ray diffraction laboratory largely through the support of Alex Deutsch. Scheduled for completion in early 1979, this facility will provide the foundation for the Section's developing program of basic mineralogical research.

Two X-ray generators will run several X-ray diffraction cameras for studies of both powered mineral samples and individual mineral crystals. Dr. Anthony R. Kampf, Associate Curator, who will be in charge of the new laboratory, reports that it will now be possible to identify conclusively virtually any obscure or unusual mineral, as well as to investigate aspects of their internal atomic structures.

COLLECTIONS INDEX

The History Division is currently in the process of compiling a comprehensive subject index system for all History Division collections. The index will include a records search and physical inventory of all history artifacts, and is expected to be completed in several years. The completed index will provide a multi-subject classification system to be used by museum staff and other researchers for exhibit planning, research, and compilating specialized catalogues. The index is in use now, even though it is not yet complete. Eventually the system will be computerized. John Cahoon, Burt Reiner, Tom Sitton, and Margaret Switzer share responsibilities for guiding the project to completion.

AMERICAN INDIAN SHOW

The Museum's Ethnic Art Shop had a marvelously successful Eighth Annual American Indian Show and Sale in December. It featured demonstrating artists, including a Navajo weaver, a Hopi basketweaver, a Navajo sandpainter, a Navajo silversmith, an Acoma potter, and a Sioux beadworker. There were traditional dances, films and a guest lecture. Remind yourself not to forget the Ninth Annual Show next December!

Some of the younger members of the Inter-Tribal Dancers of Los Angeles.

RAT-TAIL FISHES STUDY

Dr. Osamu Okamura, Professor of Biology at Kochi University in Kochi City, Japan, recently spent six weeks in the Ichthyology Section, studying the Museum's extensive collection of macrourid fishes (rat-tails) from all over the world, but particularly from the Antarctic. Dr. Okamura is a world's authority on these pointed-nosed bottom fishes that live in deep water, and he is traveling around the world examining rat-tails in preparation of a monographic publication. Dr. Tomio Iwamoto, Curator at the California Academy of Sciences's ichthyology department, studied here for a week with Dr. Okamura.

ZAIRE PHOTOS

Susan Einstein deserves the credit for the photographs in the Survey of Zairian Art: The Bronson Collection which appeared in the fall issue of TERRA. The black and white photos used were copies from the exhibition catalog.

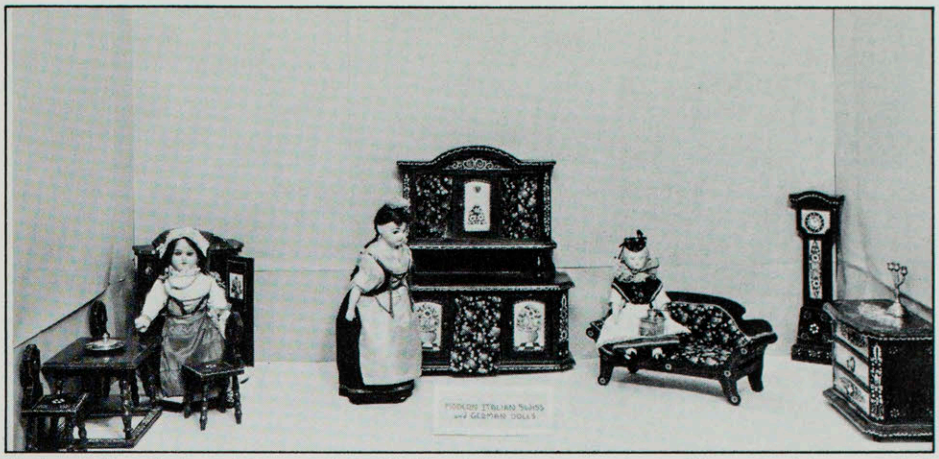
FOSSIL SNAILS AND CLAMS

Daniel R. Young, graduate student at University of North Dakota, spent six weeks in the Invertebrate Paleontology Section during November and December removing freshwater clams and snails from rocks he collected along the old Ridge Route Highway of mountainous northeastern Los Angeles County. The rocks are mudstones and sandstones that formed in a bygone lake and associated rivers during the Pliocene Epoch (about two to five million years ago), when they accumulated to a great thickness of more than 20,000 feet. At more than seventy-five places in this thickness, fossil mollusks and other lake dwelling animals were found, as well as remains of a horse. Mr. Young will use the information obtained from this study for his dissertation and donate the specimens, with his identifications, to the museum collection.

MORRISON DOLL COLLECTION

A collection of over 700 pieces of doll furniture, accessories, and miniatures recently arrived at the Museum. This collection is part of the Lucile Phillips Morrison Collection of Dolls and Miniatures, which is an ongoing donation drawn from materials Mrs. Morrison, of Arcadia, has collected over more than sixty years.

Some 1000 dolls were donated in 1977. Besides the size and quality of the collection, the donation is notable in at least one other way. Before having the Museum truck travel to Mrs. Morrison's home, doll expert Jeanette Stanbrook spent many months cataloging the dolls and packing them in specially ordered storage boxes. Additionally, Mrs. Morrison engaged a



Modern Italian, Swiss and German dolls. (1904)

photographer to take color snapshots of each doll and miniature. Lillian Bledsoe, an expert in the details of miniatures and salesman's samples, prepared a catalogue of that collection before donation.

The result has been an extraordinary doubling of the Museum's doll collection. A new storage area has been arranged to meet the greatly increased need for space for dolls, miniatures, and accessories. Plans for display of portions of the collection are in preliminary stages.

Some of the items in Mrs. Morrison's collection have been displayed in the Museum on previous occasions. In the twenties, Mrs. Morrison loaned parts of her collection and worked as a volunteer in the museum's Junior Museum.

SCOVILLE POLITICAL COLLECTION

Ogden and Sandra Scoville began donating a large and varied accumulation of conservative political materials to the History Division in 1972. Just before the Scovilles left California for a new home in Missouri, they made a final donation to the Museum of political materials from their personal collection.

When organization and cataloging is completed, the Scoville Political Collection will prove a valuable source for research in the volatile California political scene of the past two decades. Included are pamphlets, leaflets, broadsides, correspondence, news clippings, and other literature, mostly from California, for the period 1946–1978. The huge collection, which measures over eighteen linear feet in the Museum's Historical Record Center (formerly known as the History Archives), currently is being processed.

"EVOLUTION OF AFRICAN MAMMALS"

A new book, "Evolution of African Mammals," will be available from Harvard University Press in early 1979, edited by Drs. H. Basil S. Cooke and Vincent J. Maglio. The book emphasizes the fossil record documenting the development of the modern African fauna and is intended as a general summary.

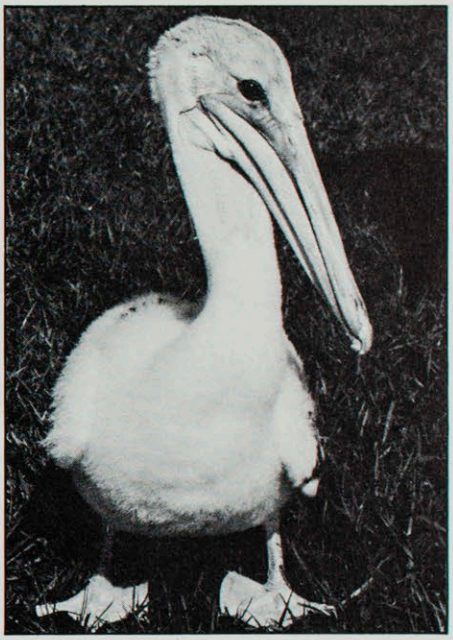
One section, Chapter 29, entitled "Cetacea," was written by Dr. Lawrence G. Barnes, Curator of Vertebrate Paleontology, and Dr. Edward Mitchell, Research Associate in Vertebrate Paleontology. The chapter reveals that some of the world's oldest known fossil whales inhabited the northern shores of ancient Africa and are represented by important fossils of many species from Eocene-age rocks in Egypt, Libya, Nigeria, and Senegal. The fossil record of more recent whales, dolphins, and porpoises around the African continent, however, is much more scanty, and the need for further field work and research is indicated.

ENDANGERED CONDOR

The California Condor *(Gymnogyps californianus)* is one of the most endangered species of birds in the world, with a population of fewer than thirty birds, all confined in the central California region just north of Los Angeles. The species has undergone a severe population decline in the past two decades, primarily from direct human interference or habitat destruction. The National Audubon Society asked the American Ornithologists' Union to form a "blue ribbon" panel to study the Condor situation and to make recommendations as to the advisability of starting a captive rearing program, in a desparate attempt to save the species from extinction. Dr. Ralph W. Schreiber, Curator of Ornithology, served on this panel and their report has just appeared as Audubon Conservation Report No. 6, strongly recommending that a captive breeding program should be started immediately. This report is available from the National Audubon Society, 950 Third Ave., New York, NY 10022, and Schreiber is more than willing to discuss their findings. He was featured on the CBS National News with Walter Cronkite last August when they covered the release of this panel report.

AND ENDANGERED PELICAN

Another Endangered Species also has occupied Dr. Schreiber's time during the past months. Schreiber is considered the leading authority on the Brown Pelican *(Pelecanus occidentalis)* in the country and has studied the species for the past 10 years but this summer was asked by the United States Navy to investigate the status of the species on a small island, Isla Vieques, off the coast of Puerto Rico, which the Navy uses as a bombing range. Under the Endangered Species Act of 1973 all government agencies must take positive action to safeguard such species and Schreiber has acted as a consultant to the Navy in devising a management plan for the island to preserve the nesting habitat for the pelicans. Interestingly, the birds pay little obvious attention to the bomb explosions or jet aircraft in the region and have nested successfully during the past year of intense military activity.



In fact, the Navy has been protecting the birds by keeping local fishermen and "tourists" away from the nesting colony. Since this human disturbance is the major cause of pelican nesting failures (in the absence of DDT contamination and with an adequate food supply) Schreiber believes that the pelican colony will thrive under the military protection.

MORE PLANT SPECIES COLLECTED IN HAWAII

Don Reynolds and Robert Gustafson, Curator and Assistant Curator, Botany section, had a very successful recent field trip to Kauai, Hawaiian Islands. Many interesting endemic plant species were collected for the museum's herbarium and photographed for use in an upcoming exhibit on Hawaii's rare and endangered flora. Dr. Reynold's work on sooty molds was greatly enhanced by material he collected and now has in culture for experimental use. They plan a return trip to the islands in June.

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